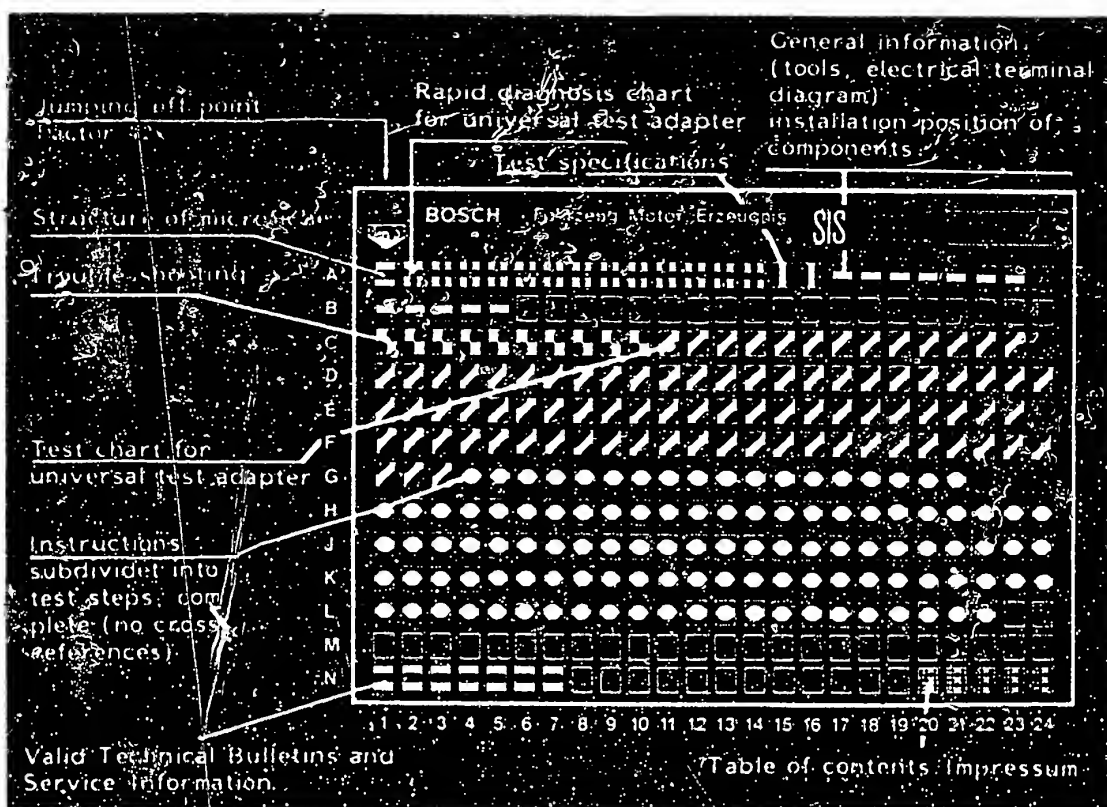


Structure of microfiche



1. Read from left to right
2. Title of microfiche (appears on each coordinate)

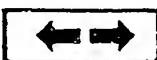
E16	Product/component/test step
	Vehicle/engine

Coordinate

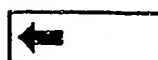
3. Limits of section



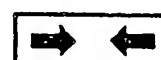
Beginning



Mid-section



End



One-page section

4. Purely vehicle-specific passages in the text are marked with a vertical bar.

5. Reference to relevant working steps in the test specifications, e.g. coordinate C6.

C6

A1

Trouble-shooting program



1. Rapid diagnosis chart for universal test adapter

The following rapid diagnosis chart makes it possible for the experienced Motronic expert to quickly check the electrical part of the system using the universal test adapter.












The rapid diagnosis chart contains the following information:

- Switch positions on universal test adapter
- Sequence of test steps
- Notes on how to operate the universal test adapter or other components
- Readings on the multimeter and motortester
- References to coordinates of the relevant detailed testing and trouble-shooting program.

If detailed information and instructions are necessary, always proceed according to the trouble-shooting program starting on Coordinate C1.

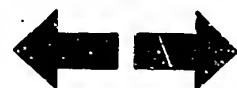


Rapid diagnostic chart for the universal test adapter

Test step	Switch setting		Notes	Test specifications (reading)	For trouble-shooting, see coordinates
	V	Ω			
1		1	Shift gear to neutral. Ignition off. Disconnect control unit and pump relay. Measure insulation resistance of engine-speed sensor Term. 8 against Term. 5.	<u>greater than 1 MΩ</u>	C 18
2		2	Measure insulation resistance of the reference mark sensor Term. 25 to Term. 5.	<u>greater than 1 MΩ</u>	C 20
3		3	Measure winding resistance of the rotational speed sensor Term. 8 to Term. 27.	<u>0.6 ... 1.6 kΩ</u>	C 22
4		4	Measure winding resistance of the reference mark sensor Term. 25 to Term. 26.	<u>0.6 ... 1.6 kΩ</u>	D 3
5		5	Measure resistance of the temperature sensor, engine (NTC II) Term.13 to Term. 5.	at 15° to 30° C: <u>1.45...3.3 kΩ</u> (dependent on temperature)	D 7
6		6	Measure resistance of the temperature sensor, air (NTC I) Term. 22 to Term. 5.	at 15° to 30° C: <u>1.45...3.3 kΩ</u> (dependent on temperature)	D 9
7		7	Measure resistance of map switch Term. 10 against Term. 5.	Manual transmission: <u>less than 10 Ω</u> automatic: $\infty\Omega$	D 11
8		8	Not used	-----	-----
9		9	Accelerator pedal in rest position. Measure resistance if idle contact. Term. 2 against term. 5	<u>less than 10Ω</u>	D 13
10		10	Step down on accelerator pedal. Measure resistance of the full-load contact Term. 3 to Term. 5.	<u>less than 10Ω</u>	D 17
11		11	Measure resistance. Ground Term. 16 to Term. 5.	<u>less than 10Ω</u>	D 19

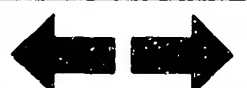
A3

Rapid diagnosis chart
BMW 525e



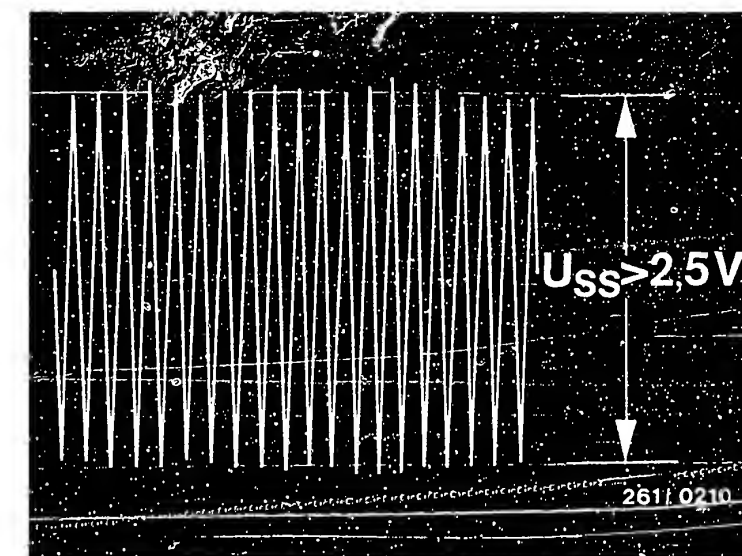
A4

Rapid diagnosis chart
BMW 525e



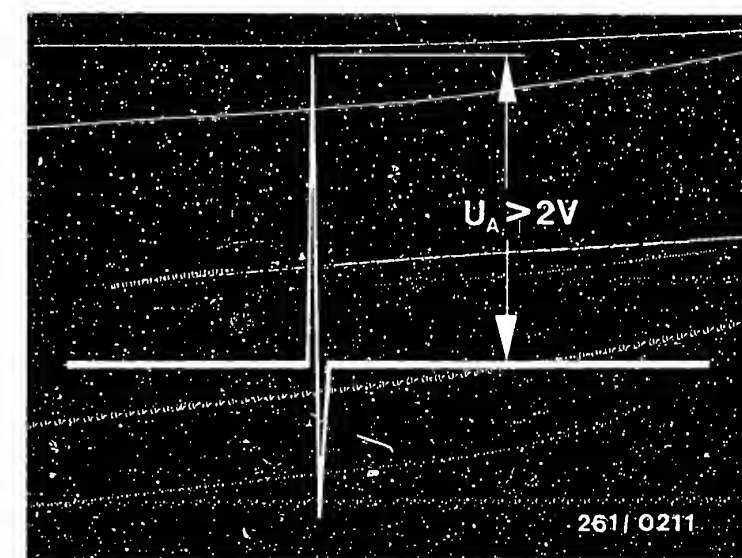
Rapid diagnosis chart for universal test adapter (continued)

Test step	Switch position		Remarks	Test specifications (Reading)	For trouble-shooting see Coordinates
	V	Ω			
12	↓	12	Measure resistance Ground Term. 17 against Term. 5.	less than 10 Ω	D 21
13	↓	13	Measure resistance. Ground Term. 19 against Term. 5.	less than 10 Ω	D 23
14	↓	14	Deleted	-----	-----
15	↓	15	Deleted	-----	-----
16	1	15	Measure signal with oscilloscope at engine-speed sensor Term. 8 against Term. 27. Shift gear to neutral and start.	see top diagram	E 1
17	2	15	Measure signal with oscilloscope at reference-mark sensor Term. 25 against Term. 26 Shift gear to neutral and start.	see bottom diagram	E 6



Engine-speed sensor signal

Reference-mark sensor signal



A5

Rapid diagnosis chart
BMW 525e



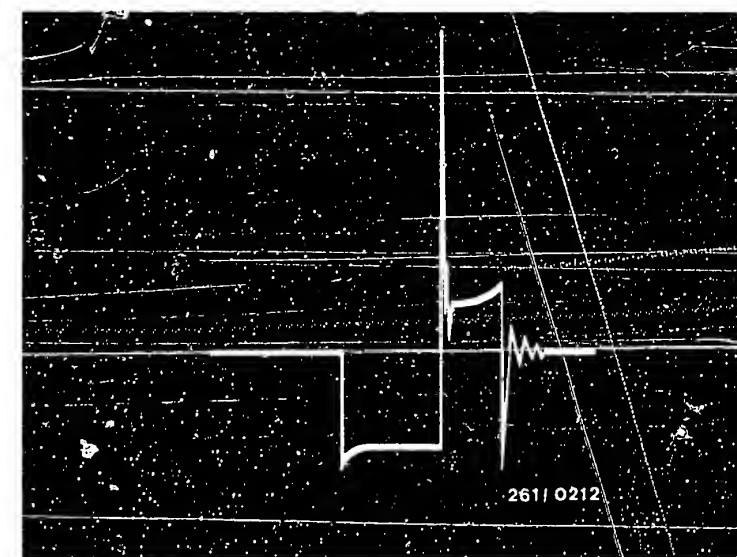
A6

Rapid diagnosis chart
BMW 525e



Rapid diagnosis chart for universal test adapter (continued)

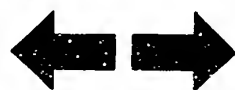
<u>Test step</u>	<u>Switch position</u>		<u>Remarks</u>	<u>Test specifications (Reading)</u>	<u>For trouble-shooting see Coordinates</u>
	V	Ω			
18	3	15	deleted	-----	-----
19	4	15	deleted	-----	-----
20	6	15	Measure voltage at relay 2 (main relay) Term. 35 against Term. 5.	<u>10 ... 15 V</u>	E 10
21	7	15	deleted	-----	-----
22	5	15	Ignition off. Connect control unit. Ignition on. Measure ignition signal with oscilloscope. Shift gear to neutral and start. Control unit, ignition output stage Term. 1 against Term. 5	see diagram	E 12



Ignition signal

A7

Rapid diagnosis chart
BMW 525e



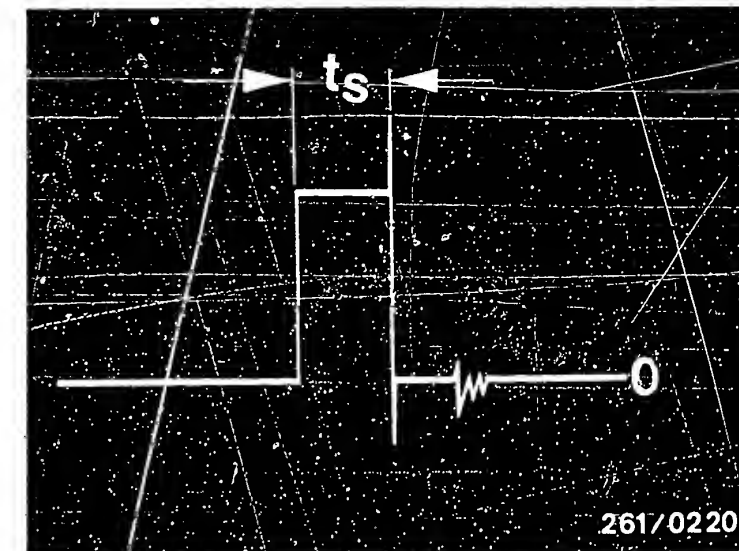
A8

Rapid diagnosis chart
BMW 525e



Rapid diagnostic chart for universal test adapter (continued)

Test step	Switch setting		But-ton	Notes	Test specific-ations (reading)	For trouble-shooting, : see coordin-ates
	V	Ω				
23	8	15		Measure voltage on control unit Term. 9 to Term. 5	<u>greater than 8 V</u>	E 14
24	9	15		Measure voltage on air-flow sensor Term. 7 to Term. 5. Air-flow sensor flap at rest:	<u>100...250 mV</u>	E 16
				Air-flow sensor flap opened:	<u>greater than 8 V</u>	
25/ 26	10/ 11	15		not used	-----	-----
27	12	15		Measure voltage. Starting signal Term. 50. Term. 4 to Term. 5.	<u>8 ... 15 V</u>	E 18
28	13	15		Check dwell period signal t_s from the control unit using oscilloscope Term. 21 to Term. 5 Shift into neutral and start.	<u>see figure</u>	E 20



t_s = Dwell period signal

A9

Rapid diagnosis chart

BMW 525e



A10

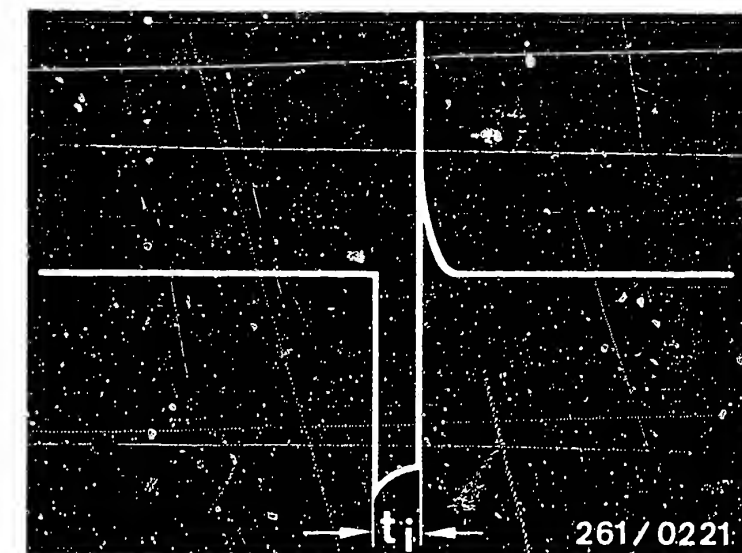
Rapid diagnosis chart

BMW 525e



Rapid diagnostic chart for the universal test adapter (continued)

Test step	Switch setting		But-ton	Notes	Test speci-fications (reading)	For trouble-shooting, see coordinates
	V	Ω				
29	14	15		Check fuel-injection signal t_i from the control unit using oscilloscope Term. 14 to Term. 5. Shift into neutral and start.	see figure at top	E 22
30	14	15	T 1	Like 29, but fuel-injection time becomes somewhat longer after button is pressed (NTC II, cold)		F 1
31	15	15		Like test step 29, but check Term. 15 to Term. 5.		F 3
32	16	15		Measure fuel-injection signal t_i from the control unit using oscilloscope Term. 11 to Term. 5. Shift into neutral and start.		F 5

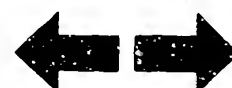


Injection signal
 t_i = Duration of injection

A11

Rapid diagnosis chart

BMW 525e



A12

Rapid diagnosis chart

BMW 525e



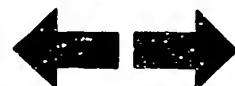
Rapid diagnosis chart for universal test adapter (continued)

Test step	Switch position		Button	Remarks	Test specifications (Reading)	For trouble-shooting see Coordinates
	V	Ω				
33	17	15		Connect pump relay. Measure voltage at pump relay Term. 20 against Term. 5. Switch on ignition.	10 ... 15 V	F 7
34	17	15		Measure voltage. Shift gear to neutral and start. Control unit, active pump control. Term. 20 against Term. 5.	max. 4 V	F 9
35	17	15	T 3	Ignition off. Connect pressure gauge. Ignition "ON". Press button T3. Read off fuel pressure.	2.3 ... 2.7 bar	F 11
36	17	15		Connect motortester. Connect CO analyzer. Let engine run. Check idle speed and CO.	650 ... 750 min ⁻¹ 0.5 ... 1.5 vol.%CO	F 17
	17	15	T 2	As above, readings unchanged.		
37	17	15		Let engine run. Check spark advance up to idle speed. Important! Idle speed must be between 650 and 750 min ⁻¹ , otherwise different spark advance angles will be indicated.	5° ... 15°	F 21
	17	15	T 6	Check spark advance at full load. Set engine speed to 2200 min ⁻¹ and press T6 (full-load button). On control unit 0 261 200 045 (for Austria) the PCB switch is set as standard to position 4. Otherwise control units 0 261 200 042 and .. 045 are identical.	7° ... 17° at engine speed 2200 min ⁻¹ Austria: 4°...14°	F 21
38	17	15		Dwell angle at idle speed	6° ... 18°	F 23
				Dwell angle at 3000 min ⁻¹	22° ... 42°	
39	17	15	T 5	Keep engine speed constant at 2000 min ⁻¹ . Press button T5. Injection signals stop and start again at approx. 1200 min ⁻¹ .	Engine "hunts"	G 1

A13

Rapid diagnosis chart

BMW 525e



A14

Rapid diagnosis chart

BMW 525e



2. TEST SPECIFICATIONS

- Idle speed: 650...750 min⁻¹
- Exhaust-gas setting:
CO value with engine at
normal op. temp., intake
air temp. +15°C...+35°C: 0.5...1.5 % by vol.CO

C7

- Fuel pressure: 2.3...2.7 bar
- Fuel pump delivery: min. 750 cm³/30 s

- Injection valve
Electrical internal
resistance at +20°C: 15.0...17.5 Ω

- Air-flow sensor
Resistance between
term. 7 and term. 6: 8 Ω...2500 Ω
(deflect air-
flow sensor
flap)
Term. 9 and Term. 6: 500 Ω...1100 Ω

C5

- Idle-control valve
(not from Bosch)
Electrical internal
resistance of thermo-
servo motor at +20°C: 15...25 Ω

- Solenoid-operated valve
Electrical internal
resistance: 18...45 Ω

See equipment and Autodata microfiches for settings for
valve clearance and other engine data.

A15

Test specifications
BMW 525 e



● Temperature sensor 1 (NTC I - Air):

C7

Internal electrical resistance
at +15°C...+30° C:

1.45...3.3 k Ω

measure on the air-flow sensor
between Term. 22 and Term. 6

at + 80° C:

280...360 Ω

Temperature sensor II (NTC II-Engine):

Internal electrical resistance
at +15° C...+30° C:

1,3...3,6 kΩ

at + 80° C:

250...390 Ω

● Engine speed sensor and reference mark sensor

C9

Internal electrical resistance:

0.6...1.6 k Ω

● Throttle valve switch

C7

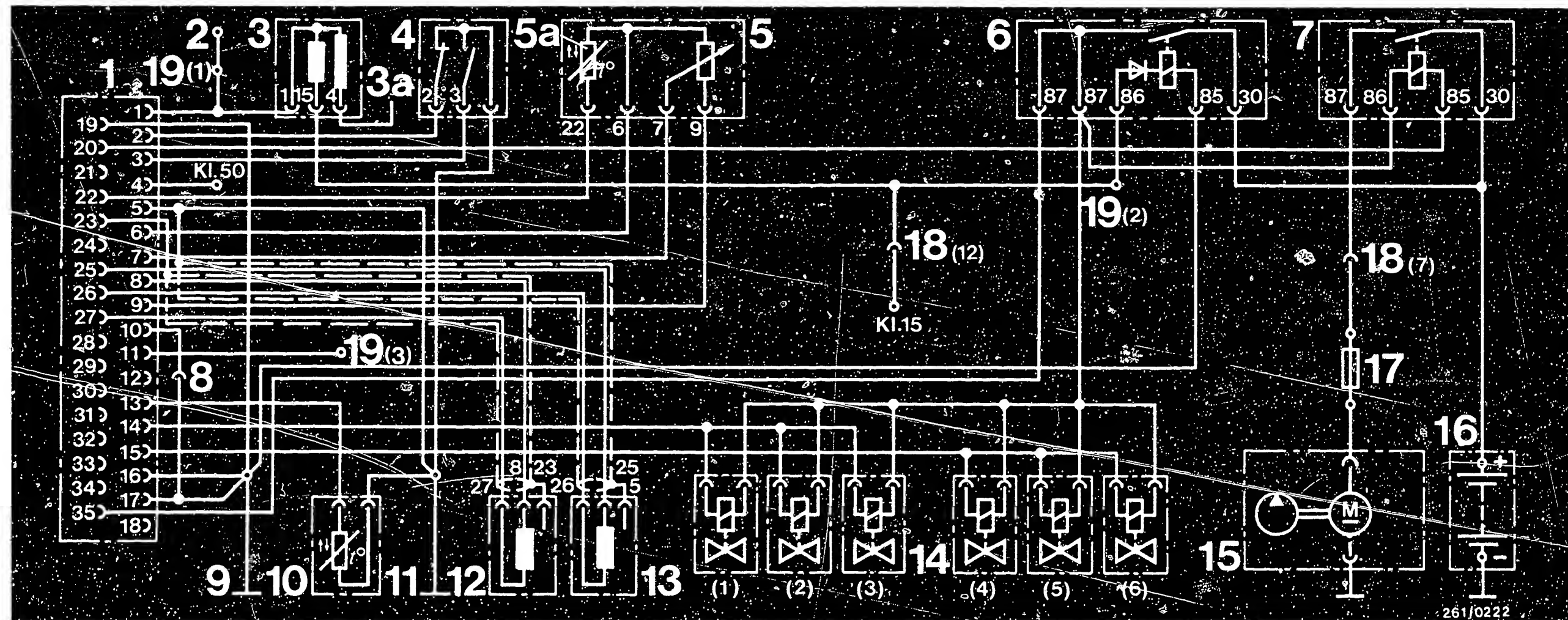
Resistance value of idle contact
(Term. 2 and Term. 43):

0 Ω

Full-load contact (Term. 3
and Term. 43):

0 Ω





3. ELECTRICAL TERMINAL DIAGRAM

- 1 = Control unit plug
- 2 = to diagnostic plug and tachometer
- 3 = Ignition coil
- 3a = to high-voltage distributor
- 4 = Throttle-valve switch
- 5 = Air-flow sensor
- 5a = Temperature sensor I (air)
- 6 = Relay 2 (main relay with reversed-polarity protection diode)

- 7 = Relay 1 (pump relay)
- 8 = Plug-in connection connected for manual transmission
- 9 = Vehicle ground for control unit output stage
- 10 = Temperature sensor (coolant)
- 11 = Vehicle ground for control unit
- 12 = Engine-speed sensor
- 13 = Reference-mark sensor
- 14 = Injection valves

- 15 = Fuel pump
- 16 = Battery
- 17 = Pump fuse F 1
- 18 = Motor plug (No. 7, No. 12)
- 19 = Plug-in connection (6-pin, No. 1,2,3 in glove compartment)

A17

Electrical terminal diagram

BMW 525e

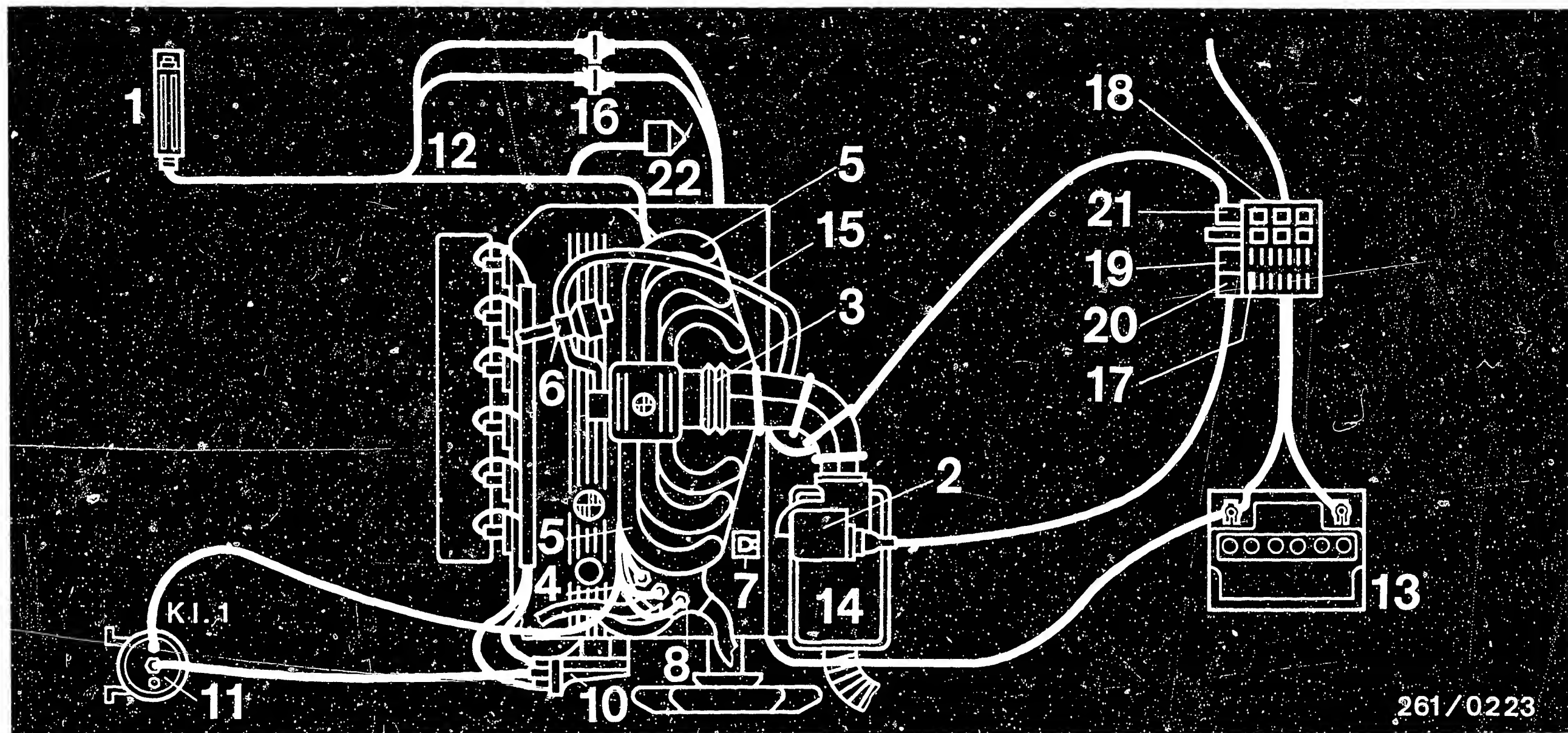


A18

Electrical terminal diagram

525e





261/0223

3.1 Electrical wiring diagram and arrangement of Motronic components

- | | | |
|-------------------------------|--|--|
| 1 = Control unit | 10 = High-voltage distributor | 17 = Pump fuse |
| 2 = Air-flow sensor | 11 = Ignition coil | 18 = Electrics box |
| 3 = Throttle-valve switch | 12 = Wiring harness | 19 = Relay 1 for fuel pump |
| 4 = Engine temperature sensor | 13 = Battery | 20 = Relay 2 for control unit |
| 5 = Injection valves | 14 = Air filter | 21 = Relay for solenoid-operated valve |
| 6 = Idle-control valve | 15 = Central ground | 22 = Solenoid-operated valve |
| 7 = Diagnostic socket | 16 = Plug-in connections for engine-speed and reference-mark sensors | |
| 8 = 45°C switch | | |

A19

Electrical wiring diagram

BMW 525e

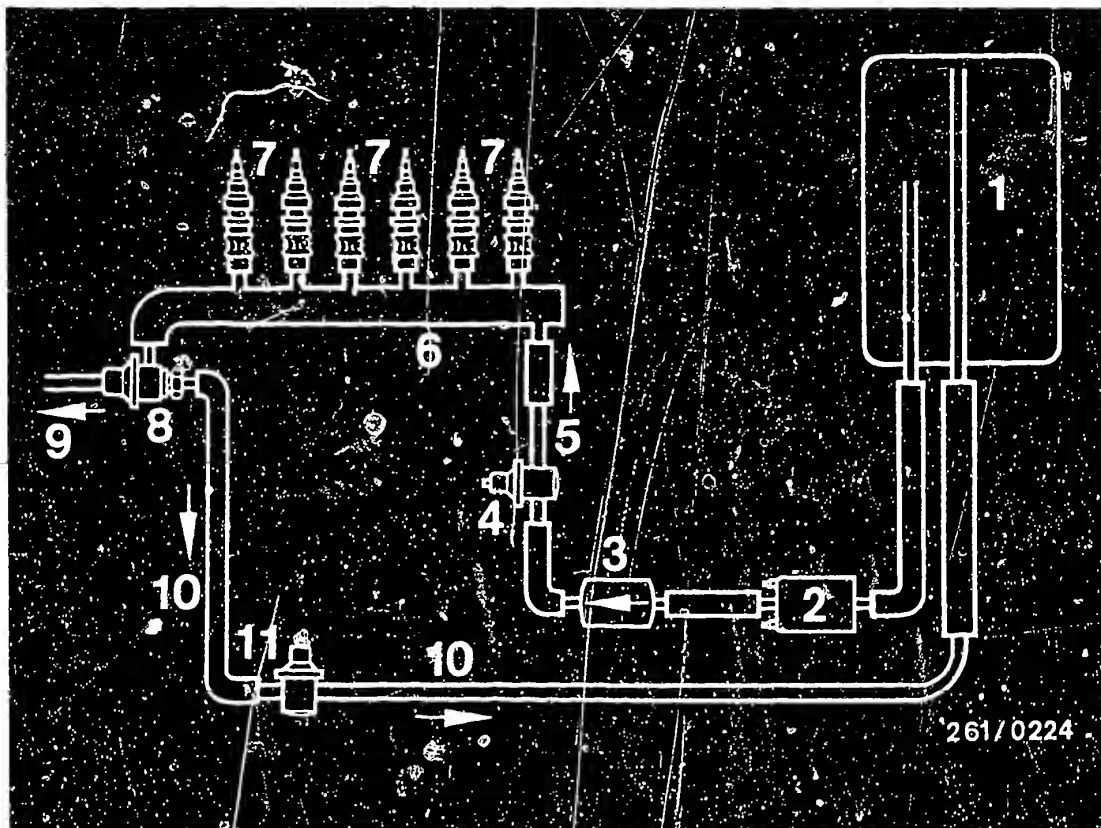


A20

Electrical wiring diagram

BMW 525e





4. DIAGRAM OF FUEL LINES

- 1 = Fuel tank
- 2 = Electric fuel pump
- 3 = Fuel filter
- 4 = 2nd fuel-line-pressure damper
- 5 = Fuel delivery line
- Fuel delivery and return lines are routed on the left-hand underside of vehicle
- 6 = Fuel-distribution pipe
- 7 = Solenoid-operated injection valves
- 8 = Pressure regulator
- 9 = to intake manifold
- 10 = Fuel return line
- 11 = 1st fuel-line-pressure damper



5. Test equipment and tools

<u>Description</u>	<u>Designation</u>	<u>Part No.</u>
Universal test adapter Adapter cable	ETT 018.01	0 684 101 801 1 684 463 124
Motortester	e.g. MOT 002.00 or 200	0 684 000 200
Calibrated infrared exhaust tester	e.g. ETT 008.04 or ETT 008.05	0 684 100 804 0 684 100 805
Multimeter (internal resistance min. 20 k Ω /V)		Commercially available e.g. type MA 2H from Metrawatt or Chinaglia, Cortina model
Pressure gauge 6 bar or Pressure tester or Pressure tester (no longer available) Three-way line as connection piece for KDJE-P100 and KDEP 1034	Quality class 1.0 0.1 bar graduations	1 687 231 154 KDJE-P 100 KDEP 1034 KDJE-P100/13



<u>Description</u>	<u>Part No.</u>
Feeler gauge for measuring the sensor air gaps (up to 1 mm)	Commercially available
Lubricant for engine-speed and reference- mark sensors	Molykote Longterm 2, commercially available
Chassis dynamometer e.g. LPS 96 or LPS 002	0 680 017 001 0 680 100 200
Test lead 2-pin, for measuring resistances and signals e.g. at injection valves	1 684 463 093
Test leads for proper connection of testers to component plugs	KDZS 0004 (2.8 mm wide) KDZS 0005 (6.3 mm wide)



6. INSTALLATION POSITION OF COMPONENTS

The indications "right" and "left" refer always to the forward direction of travel. Listed below are components which are not visible in the picture.

- | | |
|---|---|
| ● Reference-mark and engine-speed sensors: | In starting-motor ring-gear housing |
| ● Pressure regulator: | On fuel-distribution pipe in front of intake manifold |
| ● Injection valves: | On intake manifold |
| ● High-voltage distributor: | Between intake manifold and radiator fan |
| ● Fuel filter and electric fuel pump: | Under vehicle on left, near fuel tank |
| ● Air-flow sensor: | Between air filter and intake manifold |
| ● Electric fuel pump ground lead: | Under rear seat bench, on left (recess), ground point on body |
| ● Relay 1 (fuel pump relay) and relay 2 (main relay): | On fuse box |
| ● Control unit: | In glove compartment behind cover |
| ● Temperature sensor I (air): | In air-flow sensor |
| ● Temperature sensor II (engine): | In front of intake manifold near filter |
| ● Central ground: | On intake port of cylinder 5 |



Installation position of components (continued)

Electropneumatic idle-speed control consisting of:

- Idle-control valve: On valve cover
- Relay for idle-speed control: On fuse box.
- Solenoid-operated valve: Engine compartment, bulkhead
- Thermo-switch 45°C: In front of intake manifold, near fan
- Thermo-switch air 0°C: In air collection box (with blower) near right-hand fan wheel



7. Important general information

This information must be observed in order to prevent damage to the engine, control unit or ignition coil and for the safety of personnel.

7.1 Never start engine without securely connected battery.

7.2 Incorrect polarity of the supply voltage, e.g. by incorrect connection of the battery or ignition coil, can lead to irreparable damage to the control unit.

7.3 Do not use a fast charger for starting the engine.

Use only a second 12 V battery and jump leads.

Caution! Owing to different requirements of vehicle manufacturers with regard to electronic products we advise you not to use 24 V batteries as an aid for starting. Follow the vehicle owners manual.

7.4 Disconnect the battery from the vehicle electrical system before fast charging.

7.5 When charging the battery in the vehicle or when using a starting aid, follow operating instructions of fast charger and note vehicle manufacturer's instructions.

7.6 Never disconnect the battery from the vehicle electrical system with the engine running.



7.7 Do not short-circuit ignition coil term. 1 to ground (e.g. for stopping the engine). The ignition coil and possibly the control unit will suffer irreparable damage.

7.8 Never bring the positive pole of the battery into contact with ignition coil term. 1. The control unit will suffer irreparable damage.

7.9 Never connect or disconnect the wiring-harness plug of the control unit with the ignition switched on.

7.10 Remove the control unit at temperatures above 80°C (paint-drying installation).

7.11 Remove the control unit before performing welding work (electric spot welding).

7.12 Remove the relay combination when performing a compression test. This prevents undesired injecting of the injection valves.

7.13 If installing an alarm system, follow the installation instructions for Motronic vehicles or SIS microcard ALL-500.

It must be ensured that the alarm relay does not suffer interference from stray fields (e.g. from H.T. ignition cables), causing it to trip incorrectly.

7.14

CAUTION!

High-energy ignition system.
Dangerous primary and secondary voltages.



The sticker shown has the following significance:

The Motronic contains a high-energy ignition system which can be dangerous if live parts or terminals are touched (both on the primary as well as on the secondary side).

In this connection, we should like to point out that the VDE regulations, particularly VDE 0104/7.67, must be followed when working on or testing the ignition system. The ignition must always be switched off when working on the ignition system (switch off ignition/voltage source). Such work includes:

- Connection of engine testers (timing light, dwell-tach tester, ignition oscilloscope etc).
- Replacement of parts of the ignition system (spark plug, ignition coil, ignition distributor, ignition cable etc).

If, when testing the ignition system or when performing adjustments on the engine (e.g. carburetor), it is necessary to switch on the ignition (switch on ignition/voltage source), the above-mentioned dangerous voltages occur over the entire system.

There is, therefore, danger of accident not only on the individual components of the ignition system (e.g. ignition distributor, ignition coil, trigger box, ignition harness), but also on the wiring harness (e.g. tachometer connection, diagnostic plug), on plug-in connections and on testers.

B5

General information

BMW 525e



8. TROUBLE-SHOOTING

The following trouble-shooting programs are designed to enable the workshop employees using the Universal test adapter and other suitable testers to quickly detect causes of trouble on the Motronic.

Depending on the level of training and experience of the employee a choice can be made between the following procedures:

- Detailed, step-by-step trouble-shooting for employees with little experience or practice on Motronic vehicles.
- Pin-pointed direct trouble-shooting for trained and experienced employees who have a great deal of practice on Motronic vehicles.

C3

C5

Both trouble-shooting programs start by checking the electrical/electronic part of the Motronic using the Motronic test adapter ETT 018.01. This makes it possible within a short space of time to check the electrical operation of the wiring harness with the connected components (including control unit) and to quickly locate faults.

If no fault is found using the Motronic test adapter, it is necessary to continue with the detailed or the direct trouble-shooting program.

C1

Trouble-shooting
BMW 525e



C2

Trouble-shooting
BMW 525e



8.1 Detailed, step-by-step trouble-shooting

8.1.1 Test with Motronic test adapter

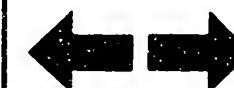
This test must come at the start of the test program and must be performed from beginning to end.

8.1.2 Trouble-shooting according to customer complaints (fault symptoms)

The table below contains possible fault symptoms and the right-hand column gives the first coordinate of the respective detailed trouble-shooting program.

The trouble-shooting program consists of logically ordered test steps for all individual components of the Motronic. If, after completing the trouble-shooting program for an assumed symptom, the fault has not been located or remedied, choose a new fault symptom and work through the respective program.

<u>Customer complaints (fault symptom)</u>	<u>Test with test adapter</u>	<u>Coordinates</u>
1. Engine fails to start or starts only with great difficulty	C 11	G 4
2. Engine starts but then dies	C 11	H 1
3. Rough idling/incorrect idle speed	C 11	H 13
4. Poor throttle take-up	C 11	J 9
5. Engine missing under all operating conditions	C 11	K 1
6. Fuel consumption too high	C 11	K 15
7. Maximum engine power/top speed not reached	C 11	L 1
8. CO concentration at idle too high or too low	C 11	L 15



8.2 Pin-pointed, direct trouble-shooting

8.2.1 Test with universal test adapter

The test with the test adapter must come at the start of the test program and must be performed from beginning to end.

8.2.2 Trouble-shooting according to customer complaints

The table below contains various fault symptoms with several possible causes of the fault in each case. The references given on the left indicate the first coordinate of the test step for the respective individual component of the Motronic. If, after testing the individual components, the fault has not been located or remedied, it is necessary to choose a new fault symptom.

Customer complaint (fault symptoms)

1. Engine fails to start or starts only with great difficulty

2. Engine starts but then dies

3. Rough idling/incorrect idle speed

4. Poor throttle take-up

5. Engine missing under all operating conditions

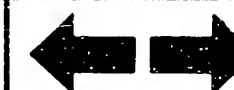
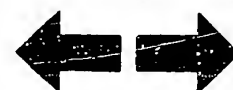
6. Fuel consumption too high

7. Maximum engine power/top speed not reached

8. CO concentration at idle too high or too low

Cause (component fault)

C11	C11	C11	C11	C11	C11	C11	C11	Test with universal test adapter
●*)								Main and pump relay defective
●*)								Electric fuel pump not operating
G12	H5		J19					Idle-control valve not opening
		H21						Idle-control valve not closing
G18	H11	H15	J15	K5	K19	L5	L17	Air-flow sensor defective



Customer complaints (fault symptoms)

1. Engine fails to start or starts only with great difficulty

2. Engine starts but then dies

3. Rough idling/incorrect idle speed

4. Poor throttle take-up

5. Engine missing under all operating conditions

6. Fuel consumption too high

7. Maximum engine power/top speed not reached

8. CO concentration at idle too high or too low

Cause (component fault)

⊖ *								Main relay
G18	H3	H19	J17				L19	Air-intake system leaking
G6								Solenoid-operated injection valves defective
⊖ *		⊖ *				⊖ *		Fuel pressure too low or zero; pressure regulator not operating
		⊖ *			⊖ *		⊖ *	Fuel pressure too high; pressure regulator not operating
				K7		L7		Fuel delivery too low
	⊖ *				⊖ *		⊖ *	Temperature sensor I (air) or temperature sensor II (coolant) defective
		H17	J13					Throttle valve not closing
						L3		Throttle valve not opening fully
				K3				Poor central ground, loose contacts, faulty plug-in connections
G18	H3	H19	J17	K3		L13	L19	Open circuit in wiring harness and plug-in connections
		⊖ *						Microswitch (idle contact) defective
		J7					L21	CO exhaust-gas setting too rich, idle adjustment
		J7	⊖ *				L21	CO exhaust-gas setting too lean, idle adjustment

Continued on C9/C10

C7

Trouble-shooting

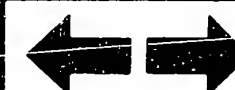
BMW 525e



C8

Trouble-shooting

BMW 525e

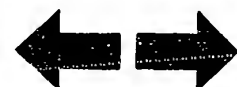


Customer complaints (fault symptoms)

1. Engine fails to start or starts only with great difficulty
 2. Engine starts but then dies
 3. Rough idling/incorrect idle speed
 4. Poor throttle take-up
 5. Engine missing under all operating conditions
 6. Fuel consumption too high
 7. Maximum engine power/top speed not reached
 8. CO concentration at idle too high or too low
- Cause (component fault)

●*)								Engine-speed sensor defective
●*)								Reference-mark sensor defective
				K13				Alternator, check interference-suppression devices
G6		H15	J11	K3	K15	L3	L17	Check secondary-circuit oscilloscope display
●*)	●*)	●*)	●*)	K11	●*)	●*)	●*)	Control unit defective

●*) If you have performed the test with Motronic test adapter, this component has already been tested. Continue testing with the next component in this column.
 However, if you have arrived at this point through a component complaint or through the test-specifications table, you must test this component with the Universal test adapter. The test program for the test adapter begins on Coordinate C11 and must be performed from beginning to end.



9. TESTING WITH UNIVERSAL TEST ADAPTER ETT.018.01
(0 684 101 801) and adapter Lead for Motronic
(1 684 463 124)

Connect the Motronic test adapter to the Motronic wiring harness (ignition must be off).

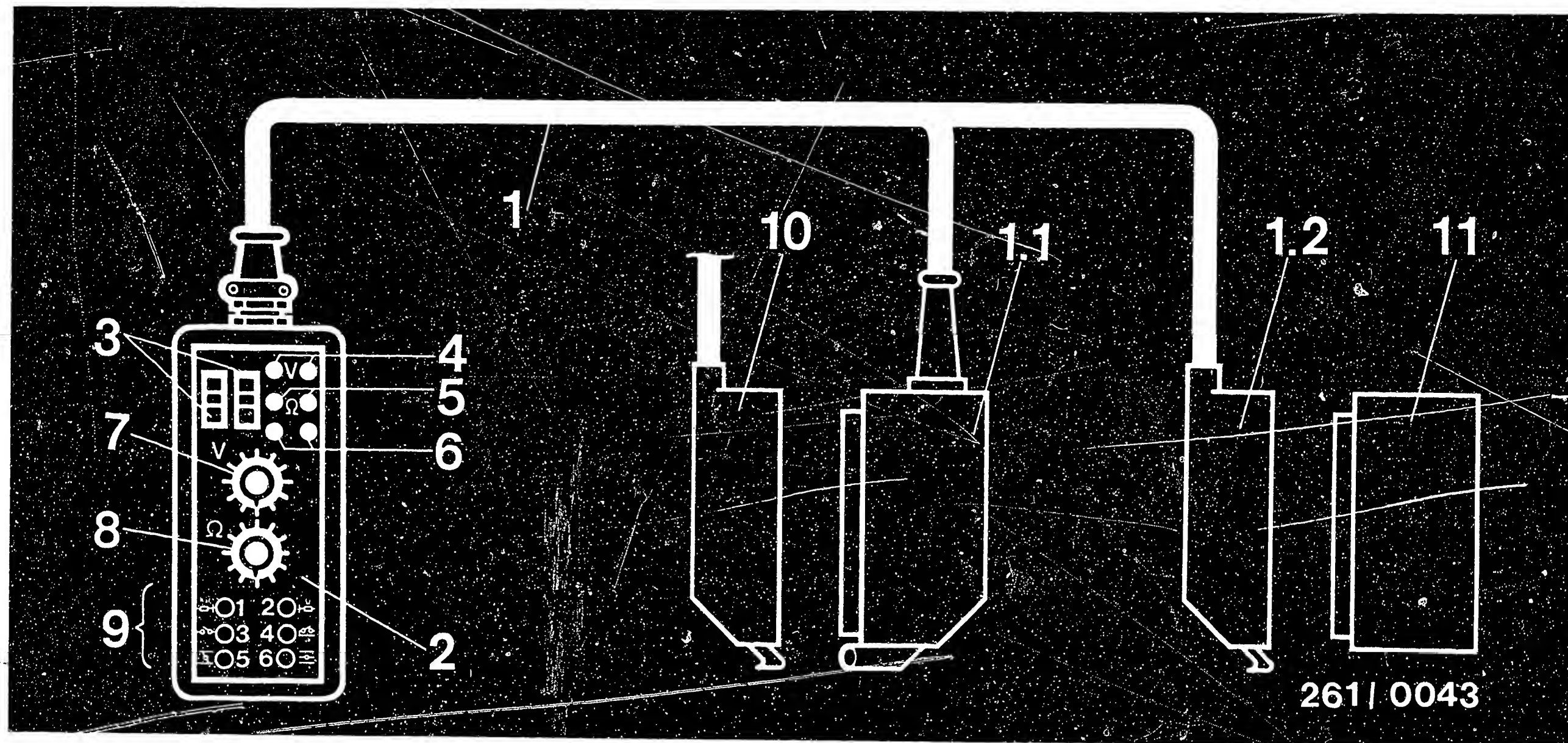
For testing the wiring harness and the connected components, only the Motronic wiring harness must be connected - but not the control unit. Be sure to observe the instructions in the test chart!

A pointer instrument for the voltage and resistance measurements (multimeter) as well as the motortester must be connected to the test adapter in order to make the measurements.

The individual test steps are selected with the program selector switch. The symbols V and Ω show the operator whether voltage or resistance is being measured. Some switch positions are necessary for simulation of operating conditions with engine running. By pressing the pushbuttons it is possible, with the control unit connected and the engine running, to simulate given operating conditions. Thus, for example, with the engine at normal operating temperature it is possible by pressing the push-button T1 to make the control unit "think" that the engine temperature is -20°C. It is then possible to evaluate the reaction of the control unit on the motor-tester.

If necessary, the circuit diagram can be used for trouble-shooting.





Universal test adapter with adapter lead for Motronic

- 1 = Adapter lead
- 1.1 = Connection to wiring harness
- 1.2 = Connection to control unit
- 2 = Universal test adapter (part no. 0 684 001 801)
- 3 = Test wells (for motortester)
- 4 = Test sockets (for voltage measurement)
- 5 = Test sockets (for resistance measurement)
- 6 = Test sockets (not occupied)
- 7 = Program switch "V"
- 8 = Program switch "Ω"

- 9 = Button panel for simulation of operating conditions
- 10 = Motronic wiring harness
- 11 = Control unit
- Button 1 = NTC II (engine), cold (-20° C)
- Button 2 = NTC II (engine), warm (+80° C)
- Button 3 = Pump energization
- Button 4 = Not occupied
- Button 5 = Throttle-valve idle contact
- Button 6 = Throttle-valve full-load contact

C12

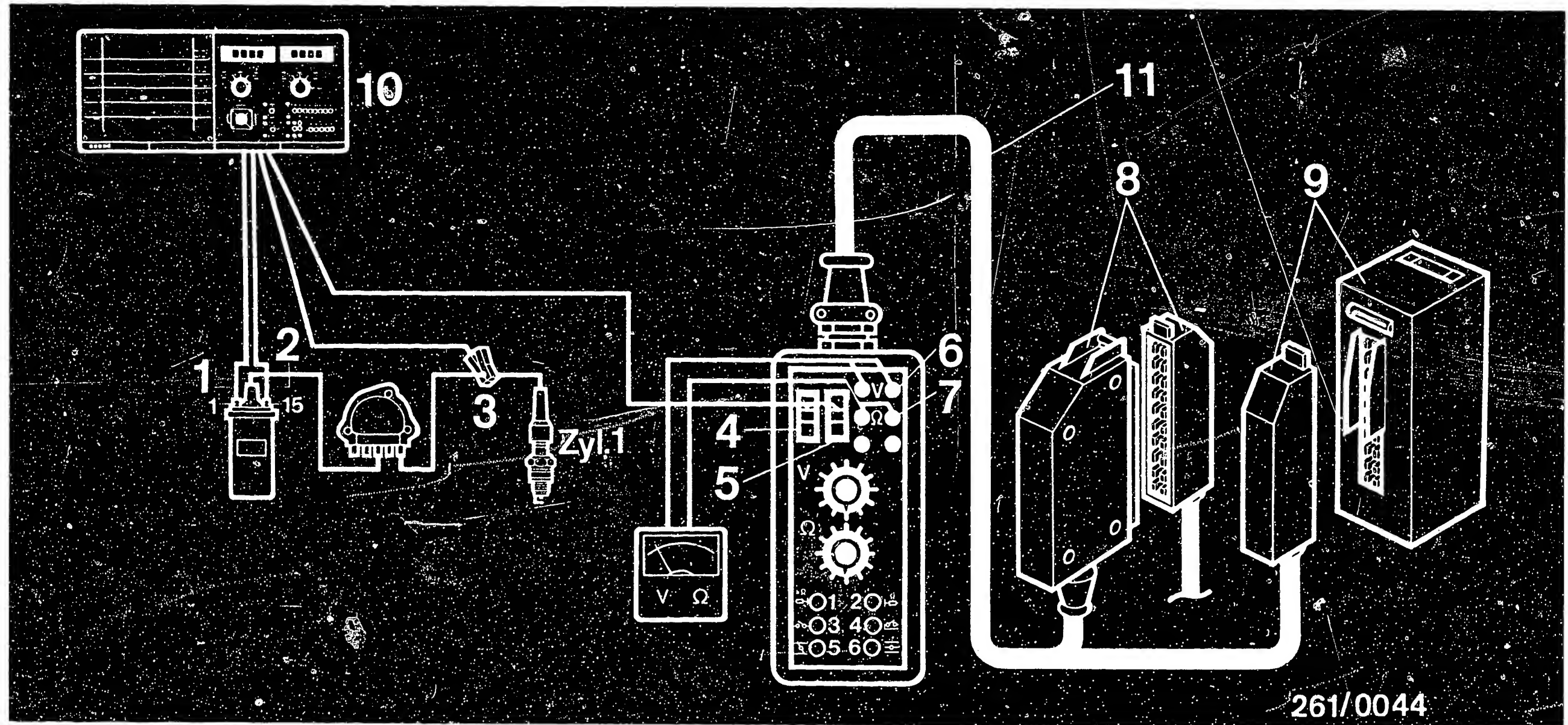
Test with universal test adapter
BMW 525e



C13

Test with universal test adapter
BMW 525e



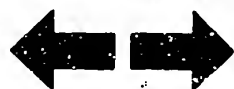


9.3 Connection diagram for test adapter

- | | |
|---|---|
| 1 = Green clip to ignition coil term. 1 | 6 = Connection of voltmeter to V sockets
(red = +, black = ground or negative) |
| 2 = Yellow clip to ignition coil term. 15 | 7 = Connection of ohmmeter to black
Ω sockets (blue) |
| 3 = Induction-type clamp-on pickup over H.T.
ignition cable of cylinder 1 | 8 = Connection to Motronic wiring harness |
| 4 = Red connection socket (test well) for
red terminal of motortester | 9 = Connection to Motronic control unit |
| 5 = Black connection socket (test well) for
black terminal of motor tester | 10 = Motortester |
| | 11 = Adapter cable for Motronic |

C14

Test with universal test adapter
BMW 525e



C15

Test with universal test adapter
BMW 525e



Preparations for test with Universal test adapter

Remove the control unit and connect the test adapter.

Installation position of the control unit: in glove compartment behind cover, the steering column.

To remove the control unit, force back the detent and hinge up and remove the plug in the direction of the arrow.

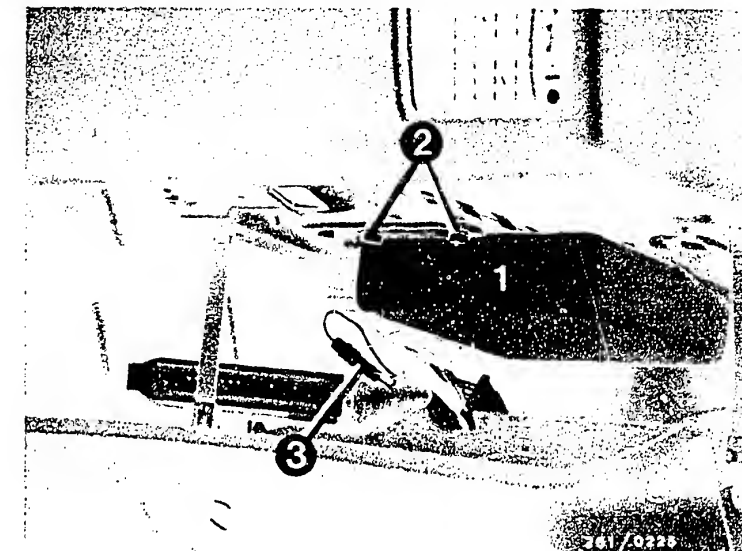
The control unit is secured by 4 screws.

Note

In order to rule out any confusion between the control units of the various systems, a mechanical locking device has been introduced. The "locating lug" (pivot point when opening and connecting the control unit) and the corresponding mounting point on the control unit have matching recesses and pins.

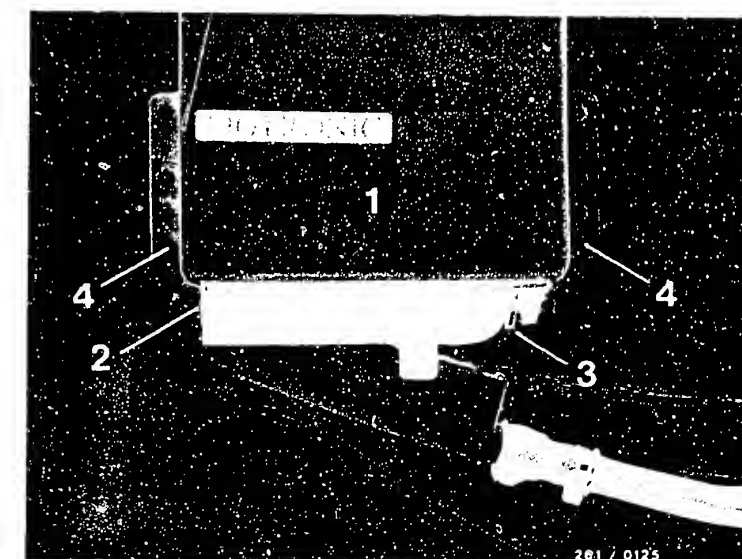
Note:

In the following test steps, the column "operation" has a white border to show which operation has to be changed compared with the previous operation.



- 1 = Control unit
- 2 = Fastening screws
- 3 = Map plug

- 1 = Control unit
- 2 = Locating lug
- 3 = Detent
- 4 = Fastening holes



C16

Test with universal test adapter
BMW 525e



C17

Test with universal test adapter
BMW 525e

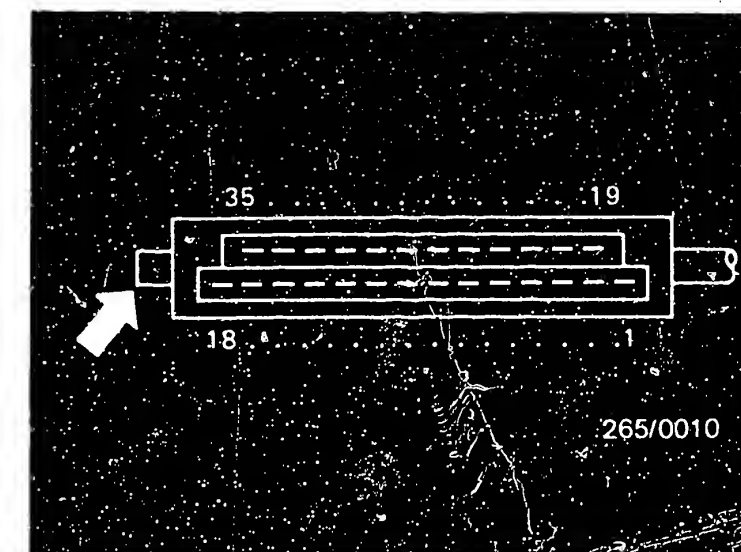


Test step 1: Switch off ignition. Disconnect control unit and pump relay.			
Operation		Reading	Testing
Program switch position "V"	↓	Ohmmeter must indicate greater than 1 M Ω	Component: Engine-speed sensor
Program switch position "Ω"	1		
Measuring equipment: Ohmmeter		<div>yes</div> <div>no</div>	Operation: Insulation between Term. 8 and ground
Measuring range: 10 M Ω			
Connection: Test sockets	Ω		
Operation in vehicle: Switch off ignition.			
		Continue testing with next test step.	Malfunction: Resistance less than 1 M Ω

Trouble-shooting:

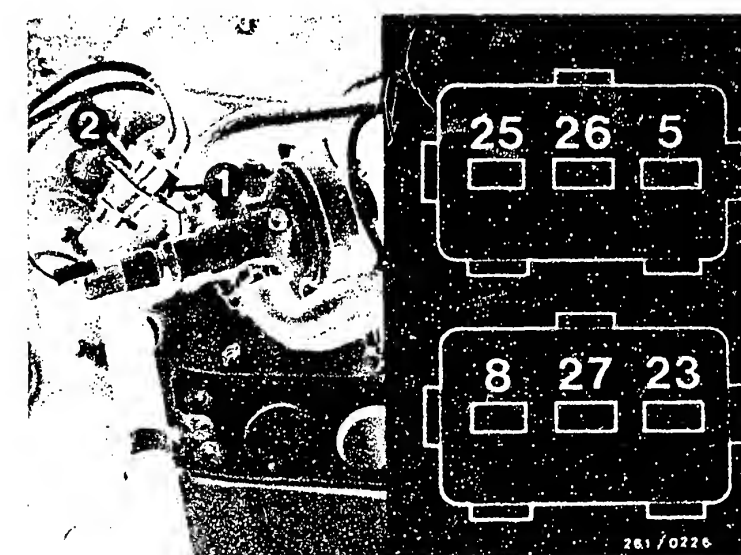
Resistance reading approx. 0 Ω :
Check lead 8 for short circuit to ground.

Resistance reading 0.6...1.6 k Ω :
Check lead 27 for short circuit to ground.



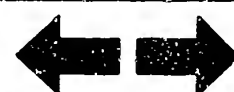
Top view of control unit plug (35-pin) with terminal numbers.
Arrow="Lug" with mechanical encoding.

- 1=Plug connector for reference-mark sensor with grey plug
- 2=Plug connector for engine-speed sensor with black plug



C18

Test with universal test adapter
BMW 525e

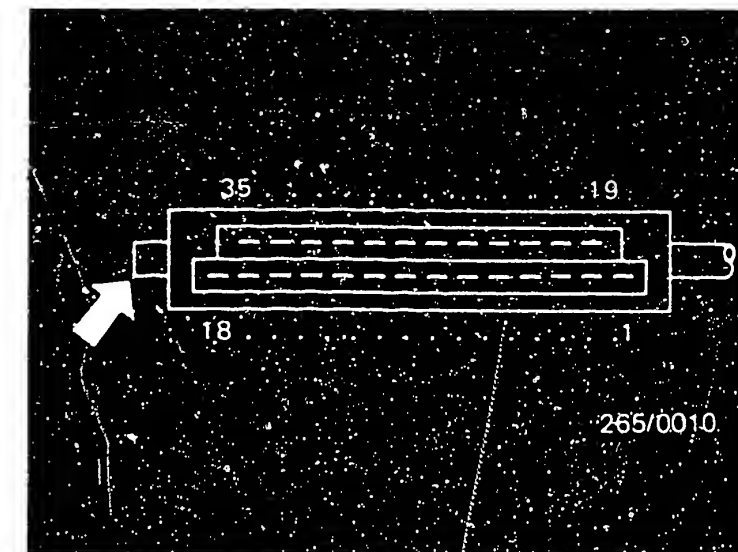


C19

Test with universal test adapter
BMW 525e

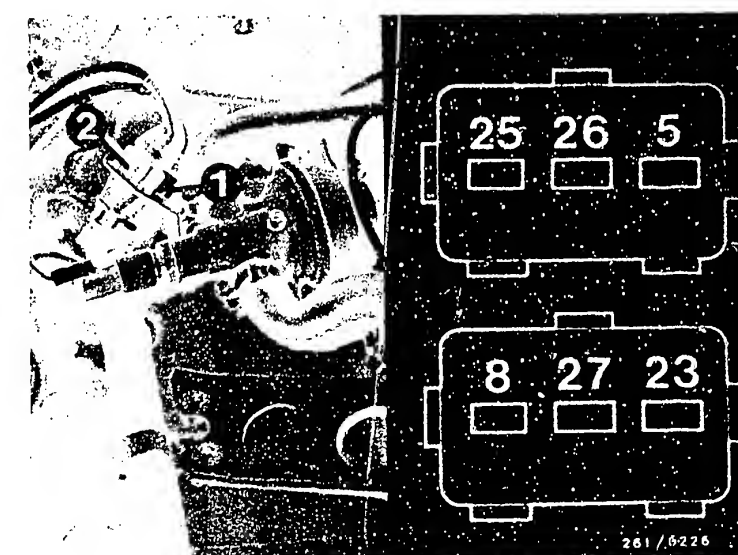


Test step 2		
Operation		Reading
Program switch position "V"	↓	Ohmmeter must indicate greater than 1 M Ω
Program switch position "N"		
Measuring equipment:		
Ohmmeter		
Measuring range:		
10 M Ω		
Connection:		
Test sockets Ω		
Operation in vehicle:		
Switch off ignition.		
	yes	no
	Continue testing with next test step.	
		Operation:
		Insulation between Term. 25 and ground
		Malfunction:
		Resistance less than 1 M Ω



Top view of control unit plug (35-pin) with terminal numbers.
Arrow="Lug" with mechanical encoding.

- 1=Plug connector for reference-mark sensor with grey plug
2=Plug connector for engine-speed sensor with black plug



Trouble-shooting:

Resistance reading approx. 0 Ω :
Check lead 25 for short circuit to ground.

Resistance reading 0.6...1.6 k Ω :
Check lead 26 for short circuit to ground.

C20

Test with universal test adapter
BMW 525e



C21

Test with universal test adapter
BMW 525e



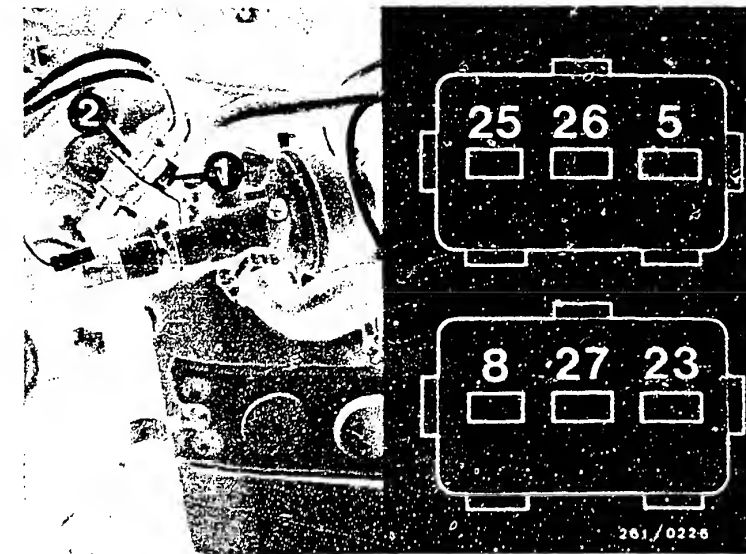
Test step 3			
Operation		Reading	Testing
Program switch position "V"	↓	Ohmmeter must indicate <u>0.6...1.6 kΩ</u>	<u>Component:</u> Engine-speed sensor
Program switch position "Ω"	3		
<u>Measuring equipment:</u> Ohmmeter		<div><div>yes</div><div>↓</div><div>Continue testing with next test step.</div></div> <div><div>no</div><div>↓</div><div></div></div>	<u>Operation:</u> Winding resistance between Term. 8 and Term. 27
<u>Measuring range:</u> 0 to 10 kΩ			
<u>Connection:</u> Test sockets	Ω		
<u>Operation in vehicle:</u> Switch off ignition			
			<u>Malfunction:</u> Resistance outside tolerance

Trouble-shooting:

- Repeat measurement directly at sensor plug.
- Check plug-in connection: Corrosion, loose contact (spring contacts must not allow themselves to be pushed back)
- Check leads from engine-speed sensor Term. 8 and Term. 27 to control unit plug Term. 8 and Term. 27.
- Replace sensor.

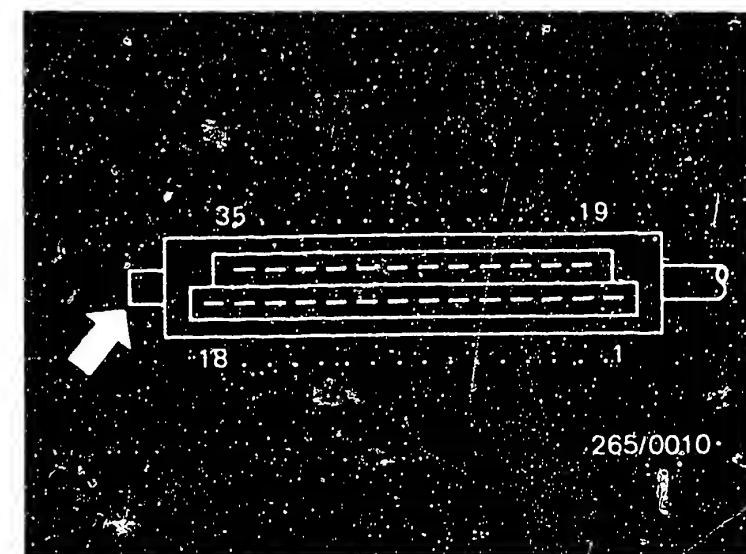
To replace the sensors, undo the plug-in connection and unscrew the hexagon-socket-head cap screw on the sensor. Remove dirt deposits on the sensor. If necessary, apply two screwdrivers to the recesses to left and right of the sensor and raise the sensor. Caution! Do not loosen the mounting.

Continued on D1/D2



- 1=Plug connector for reference-mark sensor with grey plug
2=Plug connector for engine-speed sensor with black plug

Top view of control unit plug (35-pin) with terminal numbers.
Arrow="Lug" with mechanical encoding.



C22

Test with universal test adapter

BMW 525e



C23

Test with universal test adapter

BMW 525e



Trouble-shooting - Test step 3 (continued)

Before installing the sensors, make sure that no metallic parts are sticking to the sensor (sensors contain permanent magnets). Grease sensors with Molykote Longterm 2.

Do not mix up the sensors when installing!

Pay attention to markings:

The reference-mark sensor is identified with a cable binder.

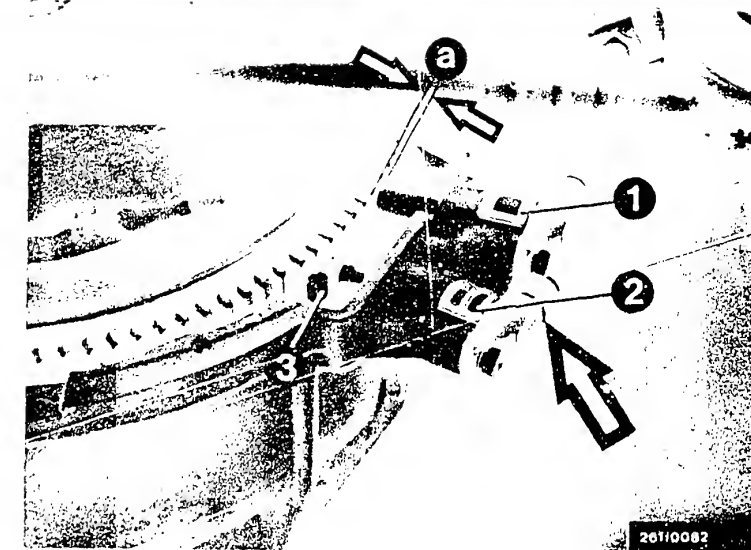
The sensors are plugged into the holes as far as they will go and are secured.

Do not use force when inserting.

When installing, make sure that the connectors are not mixed up.

Make sure that the spring contacts in the plug are seated properly and that they latch in position.

Spring contacts must not allow themselves to be pushed back.



1 = Engine-speed sensor (D)

2 = Reference-mark sensor (B)

3 = Reference mark

a = Air gap

Arrow = Identification for reference-mark sensor

D1

Test with universal test adapter

BMW 525e



D2

Test with universal test adapter

BMW 525e



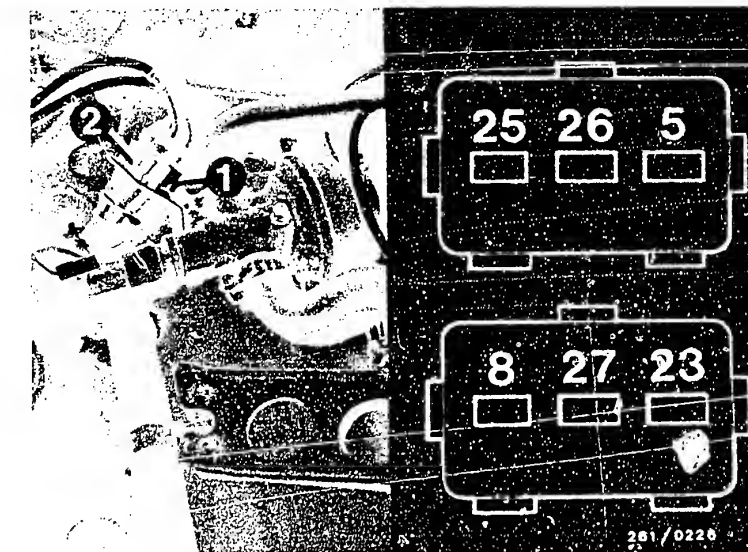
Test step 4			
Operation		Reading	Testing
Program switch position "V"		Ohmmeter must indicate <u>0.6...1.6 kΩ</u>	Component: Reference-mark sensor
Program switch position "Ω" 4			
Measuring equipment: Ohmmeter		<div><div>yes</div><div>no</div></div>	Operation: Winding resistance between Term. 25 and Term. 26
Measuring range: 0 to 10 kΩ			
Connection:	Ω		Continue testing with next test step.
Test sockets			
Operation in vehicle: Switch off ignition			Malfunction: Resistance outside tolerance.

Trouble-shooting:

- Repeat measurement directly at sensor plug.
- Check plug-in connection for corrosion, loose contact (spring contacts must not allow themselves to be pushed back)
- Check leads from reference-mark sensor Term. 25 and Term. 26 to control unit plug Term. 25 and Term. 26.
- Replace sensor.

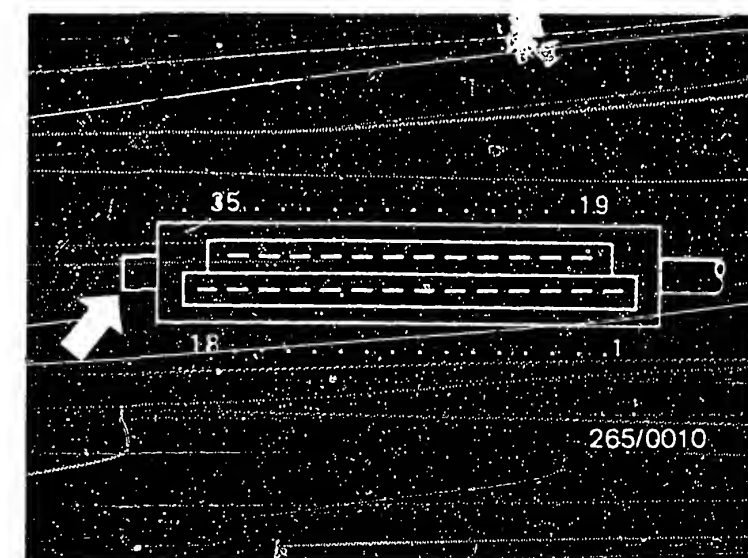
To replace the sensors, unscrew the hexagon-socket-head cap screw on the sensor. Remove dirt deposits from sensor. If necessary, apply two screwdrivers to the recesses to left and right of the sensor and raise sensor.
Caution! Do not loosen mounting.

Continued on D5/D6



- 1=Plug connector for reference-mark sensor with grey plug
 2=Plug connector for engine-speed sensor with black plug.

Top view of control unit plug (35-pin) with terminal numbers.
 Arrow="Lug" with mechanical encoding.



D3

Test with universal test adapter
 BMW 525e



D4

Test with universal test adapter
 BMW 525e



Trouble-shooting - Test step 4 (continued)

Before installing the sensors, make sure that no metallic parts are sticking to the sensor (sensors contain permanent magnets). Grease sensors with Molykote Longterm 2.

Do not mix up the sensors when installing!

Pay attention to markings:

The reference-mark sensor is identified with a cable binder.

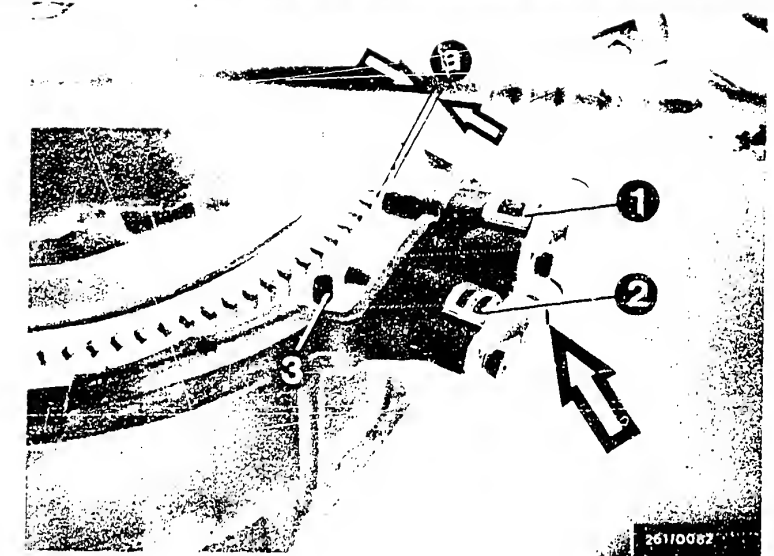
The sensors are plugged into the holes as far as they will go and are secured.

Do not use force when inserting.

When installing, make sure that the connectors are not mixed up.

Make sure that the spring contacts in the plug are seated properly and that they latch in position.

Spring contacts must not allow themselves to be pushed back.



- 1 = Engine-speed sensor (D)
- 2 = Reference-mark sensor (B)
- 3 = Reference mark
- a = Air gap
- Arrow = Identification for reference-mark sensor

D5

Test with universal test adapter
BMW 525e

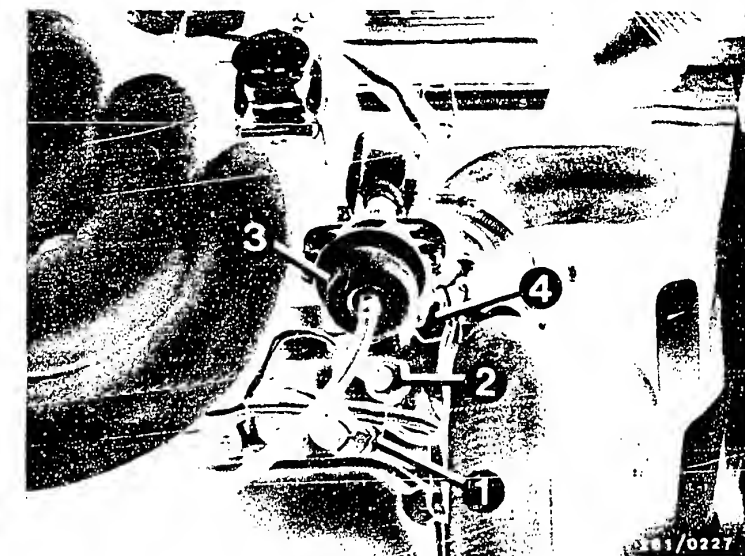


D6

Test with universal test adapter
BMW 525e



Test step 5		
Operation		Reading
Program switch position "V"	↓	Reading is temperature -dependent, i.e. note engine temperature. At ambient temper- ature (+15°...+30°C): 1.45...3.3 kΩ
Program switch position "Ω"	5	
Measuring equipment: Ohmmeter		With engine at normal operating temperature (approx. + 80° C): 280...360Ω
Measuring range:		
0 to 10 kΩ		yes no no
Connection: Test sockets	Ω	
Operation in vehicle: Switch off ignition		Continue testing with next test step.
		Malfunction: Resistance outside tolerance. Note temperature.



- 1=Engine temperature sensor
(NTC II)
2=Remote thermometer pickup
3=Pressure regulator
4=45°C switch

Trouble-shooting:

- Remove plug from temperature sensor and measure resistance directly. If necessary, replace temperature sensor.
- Check leads from temperature sensor to multiple plug Term. 13 and to ground terminal.
- Eliminate contact resistances at the plug-in connections.
Spring contacts must not allow themselves to be pushed back.

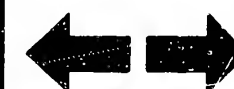
D7

Test with universal test adapter
BMW 525e



D8

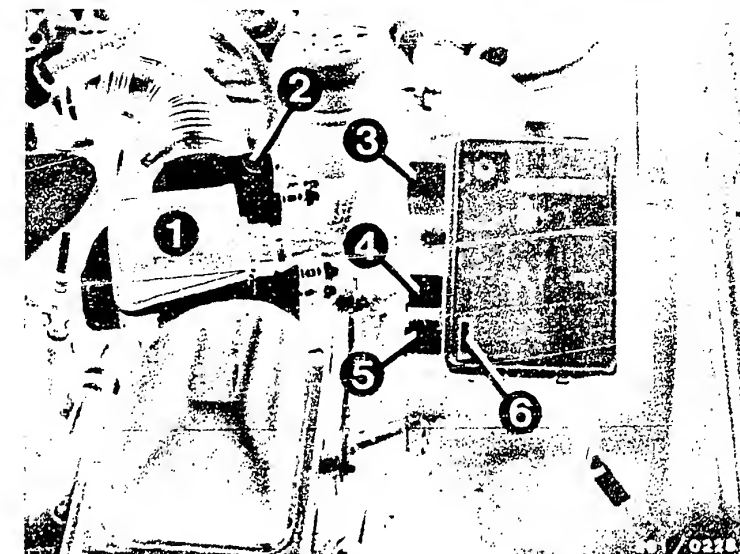
Test with universal test adapter
BMW 525e



Test step 6			
Operation		Reading	Testing
Program switch position "V"	↓	Reading is temperature -dependent, i.e. note engine temperature. At ambient temper- ature (+15°...+30° C): 1.45...3.3 kΩ	<u>Component:</u> Air temperature sensor (NTC I)
Program switch position "Ω"	6		
<u>Measuring equipment:</u> Ohmmeter		With engine at normal operating temperature (approx. + 80° C): 280...360Ω	<u>Operation:</u> Resistance between Term. 22 and ground
<u>Measuring range:</u> 0 to 10 kΩ			
<u>Connection:</u> Test sockets		yes ↓	<u>Malfunction:</u> Resistance outside tolerance. Note temperature.
<u>Operation in vehicle:</u> Switch off ignition		no ↓	
		Continue testing with next test step.	

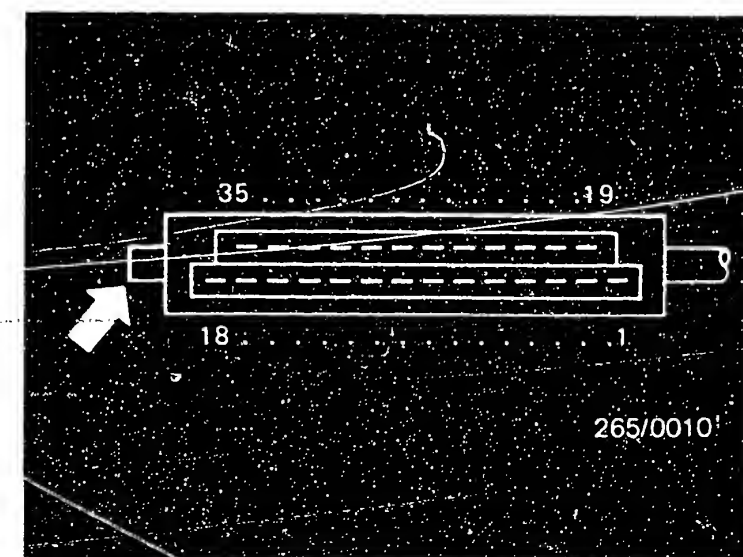
Trouble-shooting:

- Remove plug from air-flow sensor and measure resistance directly at Term.22 Term.6. If reading outside tolerance, replace air-flow sensor.
- Leads from air-flow sensor Term. 6 and Term. 22 to control unit plug Term. 6 and Term. 22.
- Eliminate contact resistances in the plug-in connections.
Spring contacts must not allow themselves to be pushed back.



- 1=Air-flow sensor with NTC I
2=Idle-mixture-adjusting screw
3=Idle-speed control relay
6=Pump fuse

Top view of control unit
plug (35-pin) with
terminal numbers.
Arrow="Lug" with mechanical
encoding.



D9

Test with universal test adapter
BMW 525e



D10

Test with universal test adapter
BMW 525e



TEST STEP 7				
Operation:		Reading:	Testing:	
Program switch "V" at position:	↓	With automatic trans- mission multimeter must indicate ∞Ω. With manual trans- mission multimeter must indicate less than 10 Ω.	Component: Lead for map select	
Program switch "Ω" at position:	7			
Measuring equipment: Multimeter (Ω range)		<div><div>yes</div><div>↓</div><div>Continue testing with next test step.</div></div> <div><div>no</div><div>↓</div><div></div></div>	Operation: Connection between Term. 10 and ground	
Measuring range: 0 to 10 kΩ				
Connection:	Ω			
Test sockets				
Operation in vehicle: Switch off ignition			Malfunction: Resistance less than ∞ Ω or greater than 10 Ω	

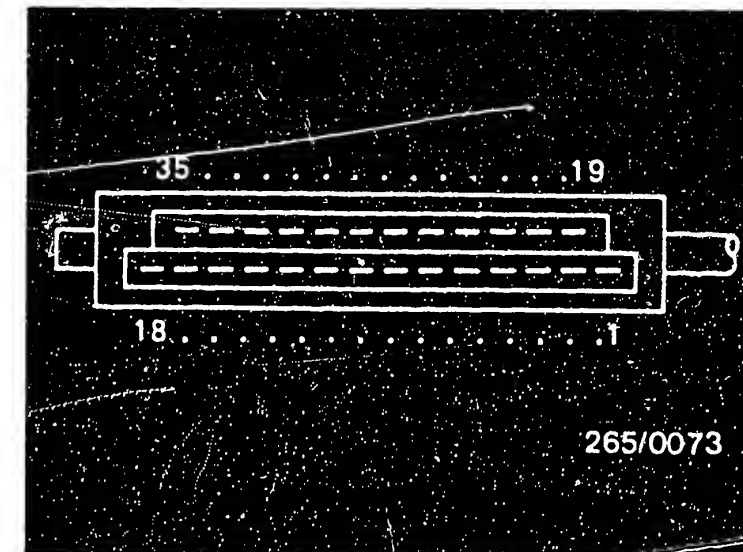
Trouble-shooting:

With automatic transmission:

- Take apart connection (3) between control unit plug Term. 10 and ground.

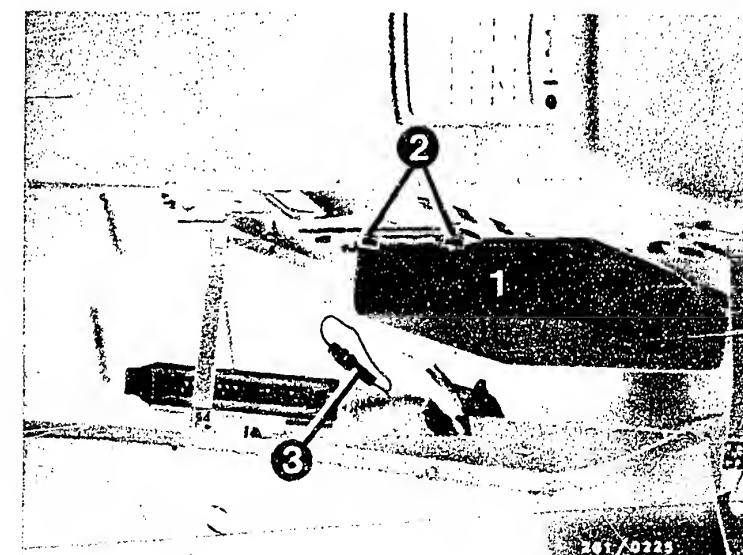
With manual transmission:

- Make connection (3) between control unit plug Term. 10 and ground.



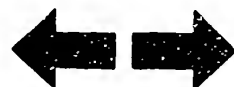
Top view of 35-pin control unit plug on Motronic wiring harness

1=Control unit
2=Fastening screws
3=Map plug



D11

Test with universal test adapter
BMW 525e



D12

Test with universal test adapter
BMW 525e



Test step 8 deleted

Test step 9

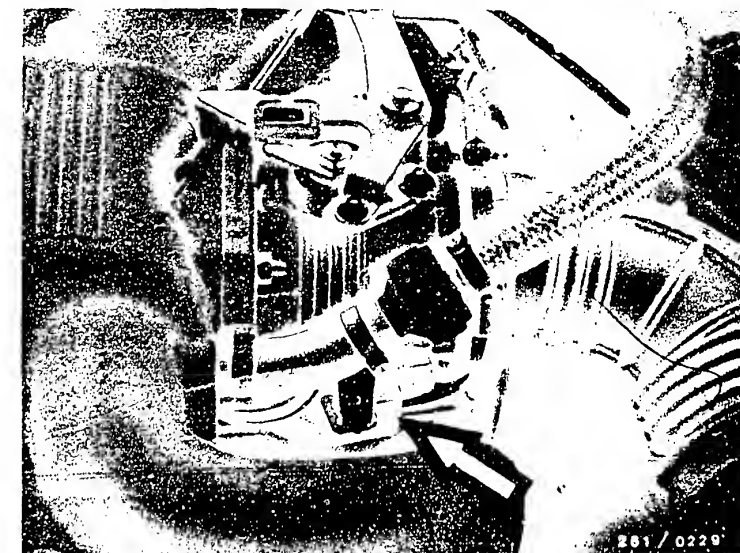
Operation		Reading	Testing
Program switch position "V"	↓	Accelerator in rest position: Less than 10 Ω	Component: Throttle-valve switch
Program switch position "Ω"	9	(Measured value is influenced by protective resistor in adapter).	Operation:
Measuring equipment: Ohmmeter		Accelerator depressed (Part-load range):	Idle contact between terminal 2 and ground
Measuring range: 0 to 10 kΩ		1) ∞ Ω	Malfunction:
Connection: Test sockets	Ω	yes ↓ Continue testing with next test step.	Resistance in rest position greater than 10 Ω or less than ∞ Ω.
Operation in vehicle: Switch off ignition		no ↓	

Trouble-shooting:

1) Adjusting the microswitch

Loosen the fastening screws. Turn the operating lever to full throttle and slowly return to the idle stop. Reading less than 10 Ω.
Turn the switch in a clockwise direction until the inner stop can be felt. Tighten screws.

Continued on D15/D16



Arrow = Throttle valve switch

D13

Test with universal test adapter
BMW 525e



D14

Test with universal test adapter
BMW 525e



Trouble-shooting - throttle-valve switch (continued)

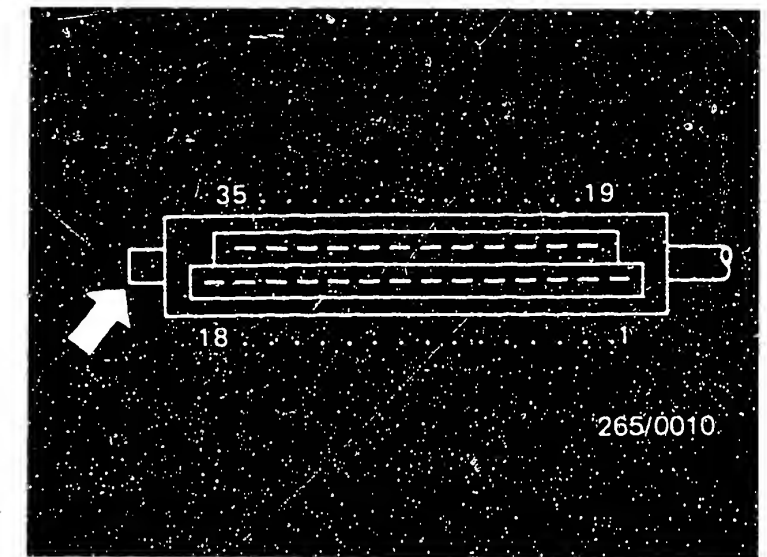
Check: Slowly open throttle in full-load direction. Reading must change to $\infty \Omega$ shortly after the throttle is opened.

If no adjustment is possible:

Check throttle-valve switch (idle contact) as well as leads from throttle-valve switch to control unit plug Term. 2 and to ground terminal.

Eliminate contact resistances.

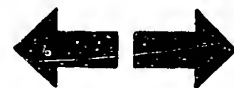
Spring contacts must not allow themselves to be pushed back.



Top view of control unit
plug (35-pin) with
terminal numbers.
Arrow="Lug" with mechanical
encoding.

D 15

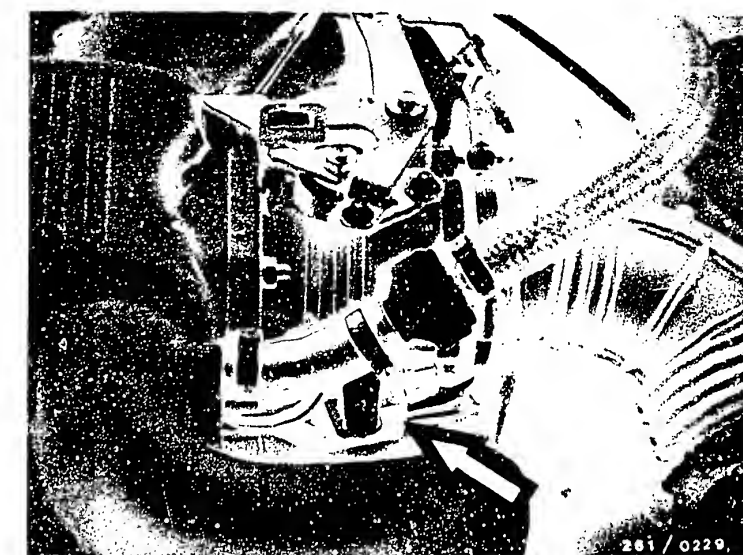
Test with universal test adapter
BMW 525e



D 16

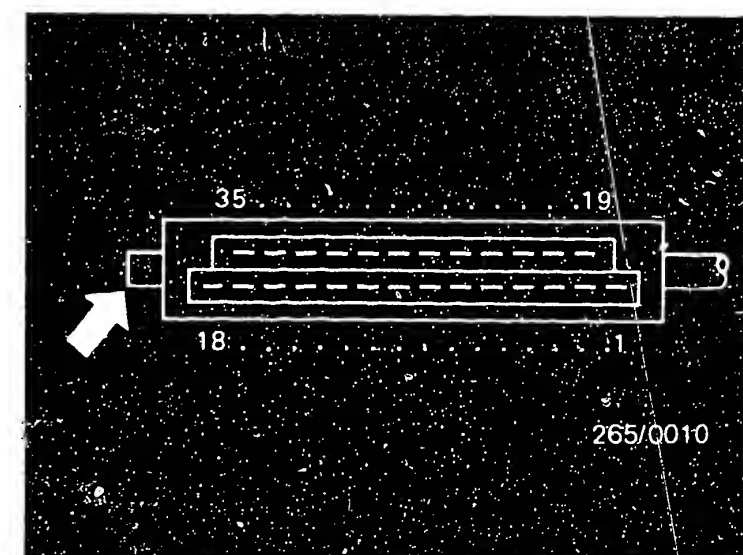
Test with universal test adapter
BMW 525e





Arrow = Throttle valve switch

Top view of control unit plug (35-pin) with terminal numbers. Arrow="Lug" with mechanical encoding.




Test step 10		
Operation		Reading
Program switch position "V"	↓	Accelerator in part-load position: $\infty \Omega$
Program switch position "Ω"	10	Accelerator at full-load stop: Less than 10Ω ¹⁾ (Measured value is influenced by protective resistor in adapter)
Measuring equipment: Multimeter (Ω range)		
Measuring range: 0 to 10 k Ω		
Connection: Test sockets	Ω	yes ↓ Continue testing with next test step.
Operation in vehicle: Switch off ignition		no ↓
		Malfunction: Resistance at full load greater than 10Ω or $\infty\Omega$.

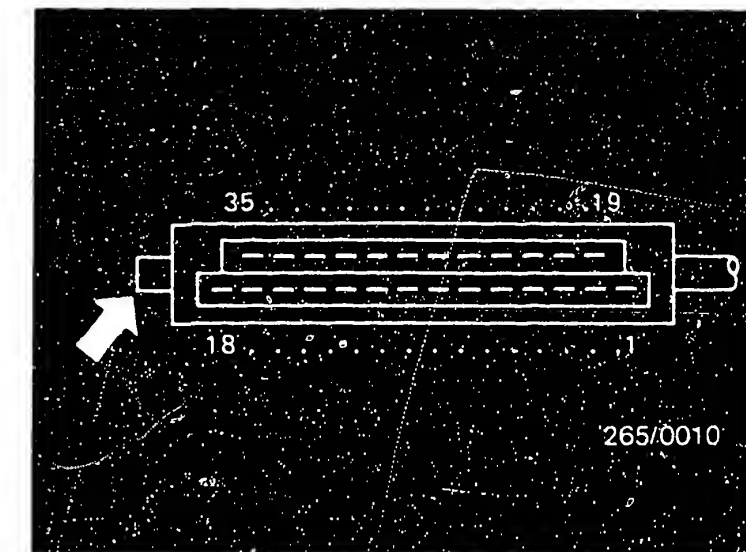
Trouble-shooting:

¹⁾ Check: Move throttle valve in full-load direction. Just before actuating lever reaches full-load stop reading changes to values less than 10Ω (full-load contact closed).

Reading greater 10Ω or $\infty\Omega$:

Check whether throttle valve is opening fully. Check bowden cable between accelerator pedal and throttle valve.
Check BOSCH throttle-valve switch as well as lead between throttle-valve switch Term. 3 and control unit plug Term. 3.
Eliminate contact resistances.
Spring contacts must not allow themselves to be pushed back.

Test step 11			
Operation		Reading	Testing
<u>Program switch position</u> "V"		Ohmmeter must indicate less than 10 Ω (Measured value is influenced by protec- tive resistor in adapter)	<u>Component:</u> Ground lead
<u>Program switch position</u> "Ω"			
<u>Measuring equipment:</u> Ohmmeter			<u>Operation:</u> Contact resistance between Term. 16 and ground
<u>Measuring range:</u> 0 to 10 kΩ			
<u>Connection:</u> Test sockets	Ω	<div>yes</div> <div>no</div>	<u>Malfunction:</u> Resistance greater than 10Ω
<u>Operation in vehicle:</u> Switch off ignition			
		<div>Continue testing with next test step.</div>	



Top view of control unit plug (35-pin) with terminal numbers.
Arrow="Lug" with mechanical encoding.

Arrow=Motronic ground terminal



Trouble-shooting:

For testing, remove wiring-harness plug from test adapter and, if necessary, use circuit diagram.

Test the following leads for continuity using ohmmeter (set value approx. 0Ω):

- From control unit plug Term. 16 to ground terminal.
- From control unit plug Term. 5 to ground terminal.

Eliminate contact resistances at connection points.

Spring contacts must not allow themselves to be pushed back.

D19

Test with universal test adapter
BMW 525e

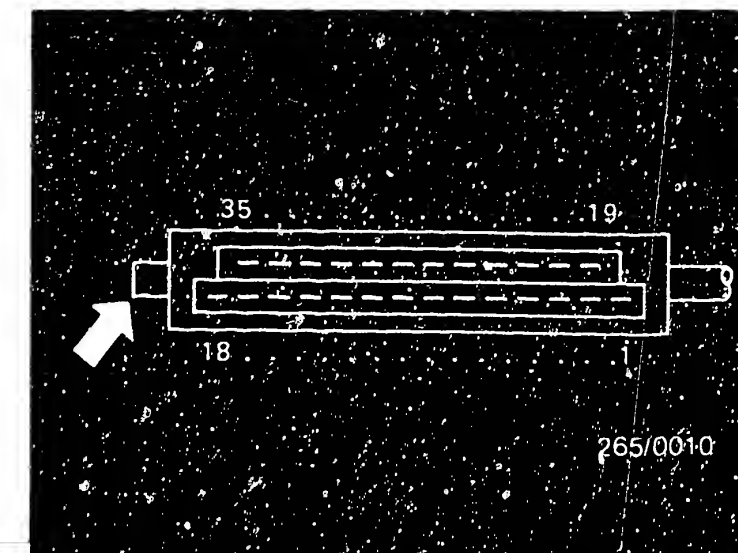


D20

Test with universal test adapter
BMW 525e



Test step 12				
Operation		Reading	Testing	
Program switch position "V"	↓	Ohmmeter must indicate less than 10 Ω (Measured value is influenced by protective resistor in adapter)	Component: Ground lead	
Program switch position "Ω"				
	12		Operation: Contact resistance between Term. 17 and ground	
Measuring equipment: Ohmmeter				
Measuring range: 0 to 10 k Ω			Malfunction: Resistance greater than 10 Ω	
Connection: Test sockets				
Operation in vehicle: Switch off ignition				
		yes		
		no		
		Continue testing with next test step.		



Top view of control unit plug (35-pin) with terminal numbers.
Arrow="Lug" with mechanical encoding.

Arrow=Motronic ground terminal



Trouble-shooting:

For testing, remove wiring-harness plug from test adapter and, if necessary, use circuit diagram.

Test the following leads for continuity using ohmmeter (set value approx. 0 Ω):

- From control unit plug Term. 17 to ground terminal.
 - From control unit plug Term. 5 to ground terminal.
- Eliminate contact resistances at connection points.

Spring contacts must not allow themselves to be pushed back.

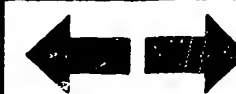
D21

Test with universal test adapter
BMW 525e

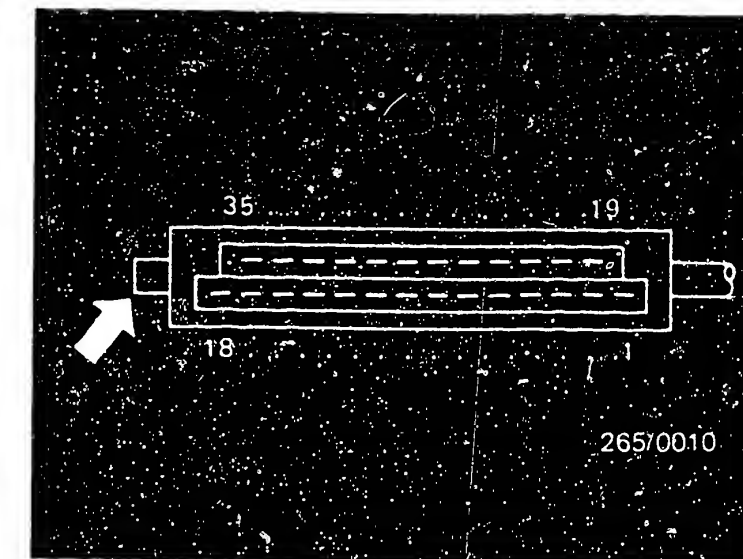


D22

Test with universal test adapter
BMW 525e

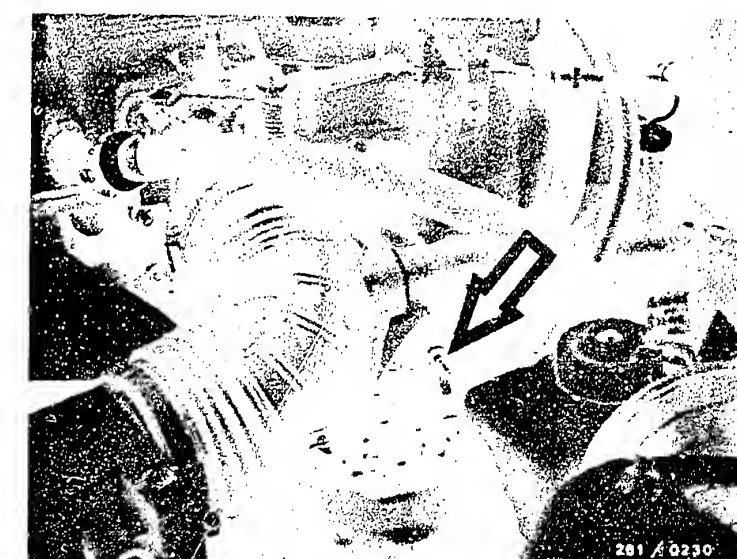


Test step 13			
Operation		Reading	Testing
Program switch position "V"	↓	Ohmmeter must indicate less than 10 Ω (Measured value is influenced by protec- tive resistor in adapter)	Component: Ground lead
Program switch position "Ω"	13		
Measuring equipment:			<div>yes</div> <div>↓</div> <div>Continue testing with <u>test step 16</u> (Test steps 14 and 15 deleted)</div> <div>no</div> <div>↓</div>
Measuring range:			
0 to 10 kΩ		Malfunction: Resistance greater than 10 Ω	
Connection:	Ω		
Test sockets			
Operation in vehicle			
Switch off ignition			



Top view of control unit plug (35-pin) with terminal numbers.
Arrow="Lug" with mechanical encoding.

Arrow=Motronic ground terminal



Trouble-shooting

For testing, remove wiring-harness plug from adapter and, if necessary, use circuit diagram.

Test the following leads for continuity using ohmmeter (set value approx. 0 Ω)

- From control unit plug Term. 19 to ground terminal.
 - From control unit plug Term. 5 to ground terminal.
- Eliminate contact resistances at connection points.

Spring contacts must not allow themselves to be pushed back.

D23

Test with universal test adapter
BMW 525e



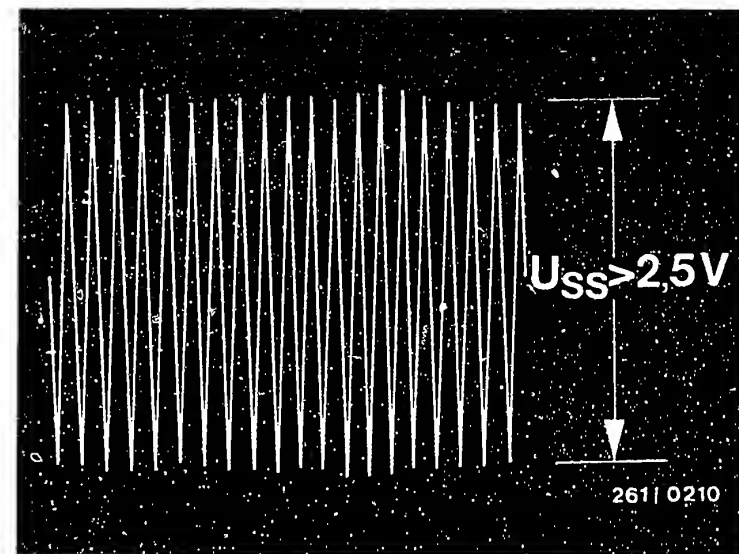
D24

Test with universal test adapter
BMW 525e



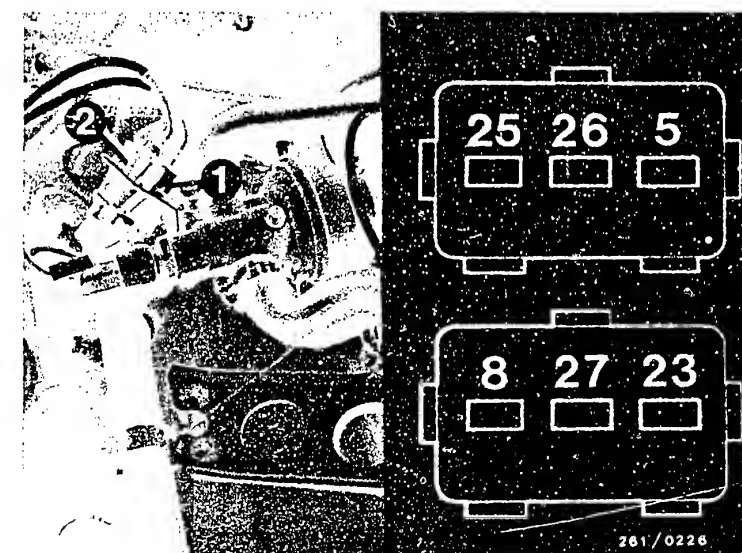
Test step 16 (Test steps 14 and 15 deleted)		
Operation		Reading
Program switch position "V"	1	For rotational speed sensor signal, see figure at top.
Program switch position "Ω"	15	
Measuring equipment: Motortester, oscilloscope		Lever to left-hand stop (calibrated voltage range)
Measuring range: Special input		
Connection: Test wells; red clip to red well, black clip to black well		<div> <div>yes</div> <div>no</div> </div>
Operation in vehicle: Shift gear to neutral and operate starting motor		
		Continue testing with next test step.

Testing
<u>Component:</u> Engine-speed sensor
<u>Operation:</u> Amplitude (signal) at terminals 8 and 27
<u>Malfunction:</u> No signal or signal too small. Incorrect signal



Rotational speed sensor signal

- 1=Plug connector for reference-mark sensor with grey plug
 2=Plug connector for engine-speed sensor with black plug.



Trouble-shooting:

No signal or signal too small:

- Cranking speed below 200 min^{-1} ; charge battery.

Continued on E3

E1

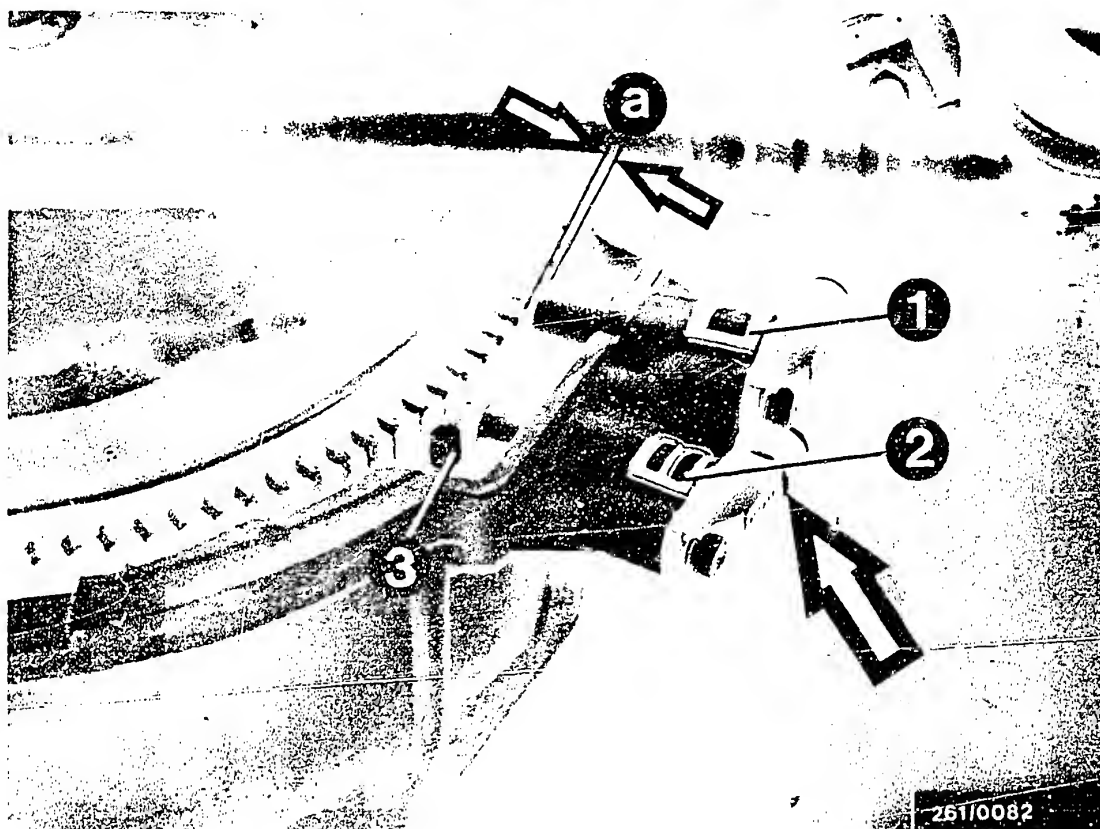
Test with universal test adapter
 BMW 525e



E2

Test with universal test adapter
 BMW 525e





- 1 = Engine-speed sensor (D)
- 2 = Reference-mark sensor (B)
- 3 = Reference mark
- a = Air gap
- Arrow = Identification for reference-mark sensor

Trouble-shooting test 16 (continued)

- Check nominal air gap $a = 0.8 \text{ mm}$:
remove cover plate from ring gear housing.

Continued on E4/E5

Trouble-shooting - Test step 16 (continued)

- Replace engine-speed sensor:
Unscrew hexagon-socket-head cap screw on sensor. Remove dirt deposits on sensor.
If necessary, apply two screwdrivers to the recesses left and right of the sensor and raise sensor.
- Incorrect signal (greatly extended in bottom diagram):
Heavily damaged tooth on starting motor ring gear. Replace ring gear.

Before installing the sensors, make sure that no metallic parts are sticking to the sensor (sensors contain permanent magnets). Grease sensors with Molykote Longterm 2.

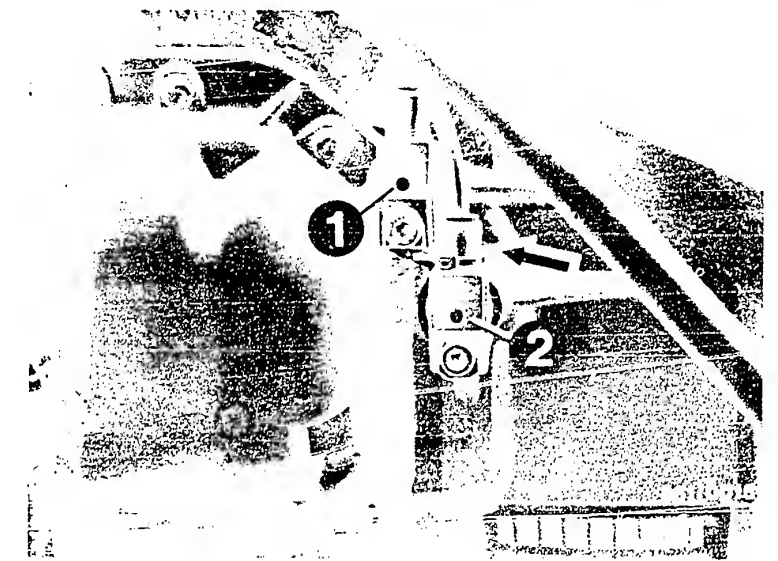
Do not mix up the sensors when installing!

Pay attention to marking: Reference-mark sensor with marking and grey plug.
Engine-speed sensor without marking, black plug.

The sensors are plugged into the hole as far as they will go and secured. Do not use force when inserting.

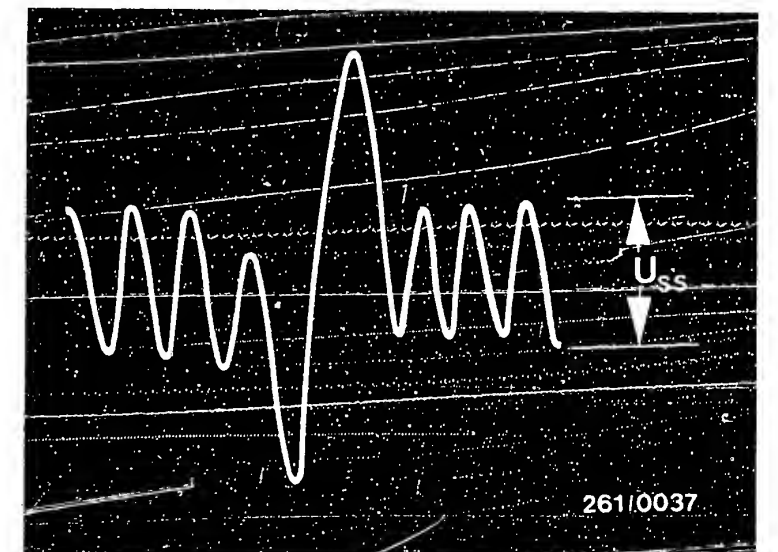
When installing, make sure that the connectors are not mixed up.

Make sure that the spring contacts in the plug are correctly seated and latch in position.
Spring contacts must not allow themselves to be pushed back.



1 = Engine-speed sensor
2 = Reference-mark sensor
Arrow = Identification on
reference-mark sensor

Incorrect engine-speed sensor
signal



261/0037

E4

Test with universal test adapter
BMW 525e



E5

Test with universal test adapter
BMW 525e



Trouble-shooting - test step 17 (continued)

- Check nominal air gap $a = 0.8$ mm:
Remove cover plate from ring gear housing.
The reference mark (3) can be brought up to the reference-mark sensor by turning the ring gear e.g. using a wrench.
Measure the air gap (a) with feeler gauge.

Incorrect signal:

- Signal is incorrect if negative spike comes first. Check assignment of leads according to circuit diagram and picture opposite.
- Replacing the reference-mark sensor:
Unscrew hexagon-socket-head cap screw on sensor. Remove dirt deposits on sensor. If necessary, apply two screwdrivers to the recesses to left and right of the sensor and raise sensor.

Before installing the sensors, make sure that no metallic parts are sticking to the sensor (sensors contain permanent magnets): Grease sensors with "Molykote Longterm 2".

Do not mix up the sensors when installing.

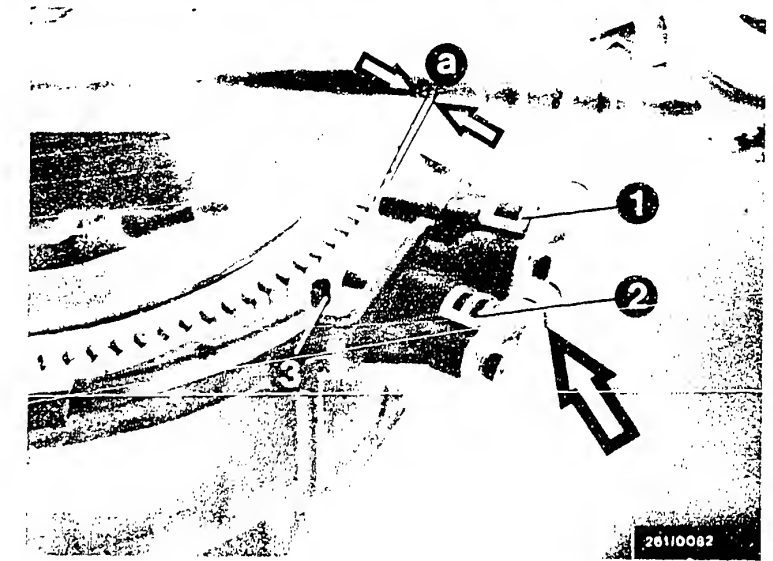
Pay attention to markings:

The reference-mark sensor is identified with "B" and a cable binder.

The sensors are plugged into the hole as far as they will go and secured. Do not use force when inserting.

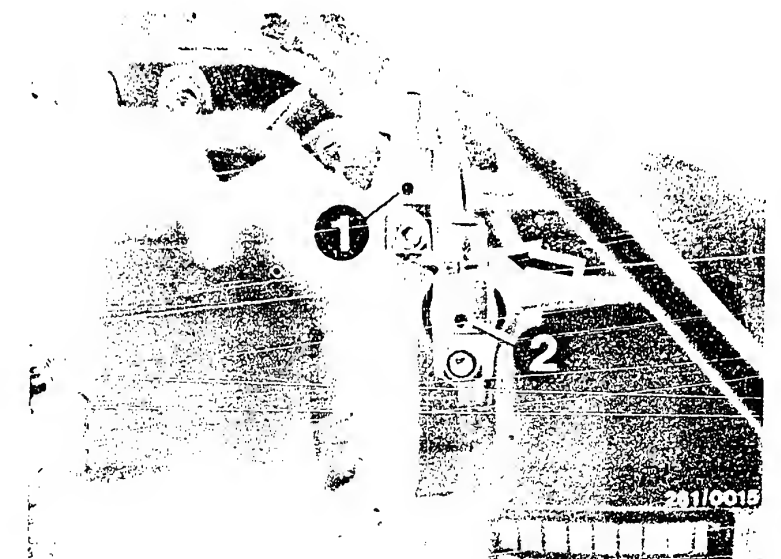
When installing, make sure that the connectors are not mixed up.

Make sure that the spring contacts in the plug are correctly seated and latch in position. Spring contacts must not allow themselves to be pushed back.



1 = Engine-speed sensor (D)
2 = Reference-mark sensor (B)
3 = Reference mark
a = Air gap
Arrow = Identification for reference-mark sensor

1 = Engine-speed sensor
2 = Reference-mark sensor
Arrow = Identification on reference-mark sensor



E8

Test with universal test adapter
BMW 525e

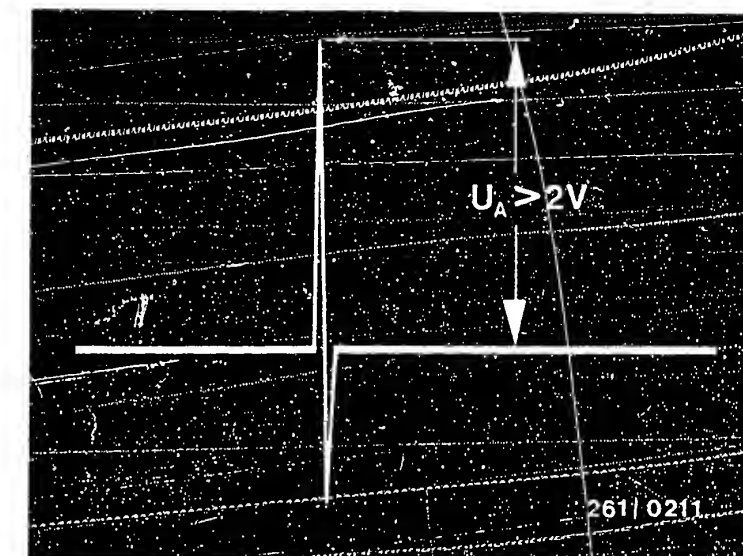


E9

Test with universal test adapter
BMW 525e

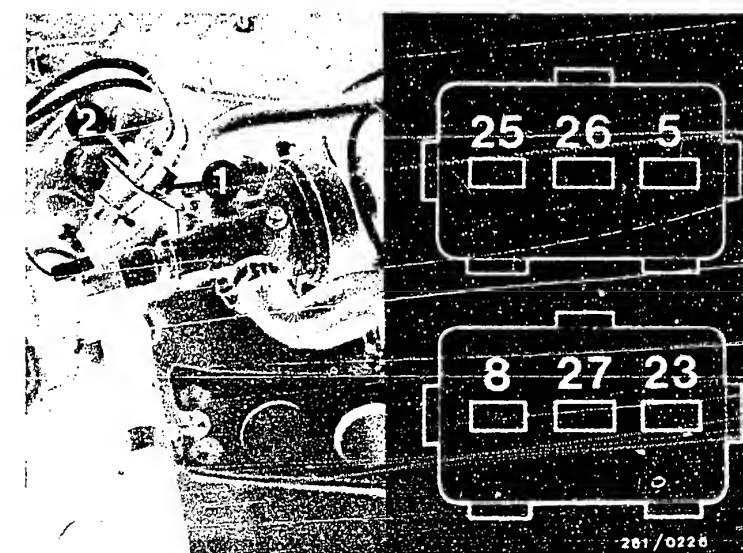


Test step 17			
Operation		Reading	Testing
Program switch position "V"	2	Reference mark sensor signal (see top diagram)	Component: Reference-mark sensor
Program switch position "N"			
Measuring equipment: Motortester, oscilloscope	15	Automatic and manually -shifted transmission Lever to left-hand stop (calibrated voltage range)	Operation: Amplitude (signal) at terminals 25 and 26
Measuring range:			
Special input			Malfunction: No signal or signal too small. Incorrect signal. Negative peak coming first.
Connection: Test wells; red clip to red well, black clip to black well	<div>yes</div> <div>↓</div> <div>Continue testing with test step 20</div> <div>(Test steps 18 and 19 deleted)</div>		
Operation in vehicle: Shift gear to neutral and operate starting motor	<div>no</div> <div>↓</div>		



Reference mark sensor signal
Positive peak must come first.

1=Plug connector for
reference-mark sensor with
grey plug
2=Plug connector for engine-
speed sensor with black plug.



Trouble-shooting:

No signal or signal too small:
• Cranking speed below 200 min⁻¹ → charge battery.

Continued E8/E9

E6

Test with universal test adapter
BMW 525e

← →

E7

Test with universal test adapter
BMW 525e

← →

Trouble-shooting - test step 17 (continued)

- Check nominal air gap $a = 0.8 \text{ mm}$:
Remove cover plate from ring gear housing.
The reference mark (3) can be brought up to the reference-mark sensor by turning the ring gear e.g. using a wrench.
Measure the air gap (a) with feeler gauge.

Incorrect signal:

- Signal is incorrect if negative spike comes first. Check assignment of leads according to circuit diagram and picture opposite.
- Replacing the reference-mark sensor:
Unscrew hexagon-socket-head cap screw on sensor. Remove dirt deposits on sensor. If necessary, apply two screwdrivers to the recesses to left and right of the sensor and raise sensor.

Before installing the sensors, make sure that no metallic parts are sticking to the sensor (sensors contain permanent magnets): Grease sensors with "Molykote Longterm 2".

Do not mix up the sensors when installing.

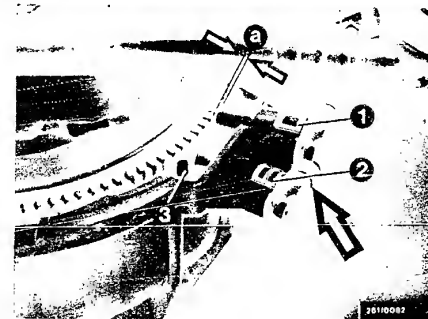
Pay attention to markings:

The reference-mark sensor is identified with "B" and a cable binder.

The sensors are plugged into the hole as far as they will go and secured. Do not use force when inserting.

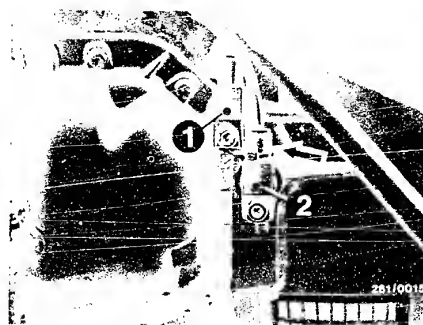
When installing, make sure that the connectors are not mixed up.

Make sure that the spring contacts in the plug are correctly seated and latch in position. Spring contacts must not allow themselves to be pushed back.



1 = Engine-speed sensor (D)
2 = Reference-mark sensor (B)
3 = Reference mark
a = Air gap
Arrow = Identification for reference-mark sensor

1 = Engine-speed sensor
2 = Reference-mark sensor
Arrow = Identification on reference-mark sensor



E8

Test with universal test adapter

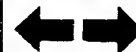
BMW 525e



E9

Test with universal test adapter

BMW 525e



Test step 20 (Test steps 18 and 19 deleted)

Operation		Reading	Testing
Program switch position "V"	6	Voltmeter must indicate 10...15 V yes no	<u>Components:</u> Relay 2 (main relay)
Program switch position "N"	15		
<u>Measuring equipment:</u> Voltmeter <u>Measuring range:</u> 15 V			<u>Operation:</u> Supply voltage for control unit at terminals 35 (+) and 5 (ground)
Connection: Test sockets, (red = +, black = ground)	V		<u>Malfunction:</u> Voltage less than 10 V
<u>Operation in vehicle:</u> Switch on ignition		Continue testing with test step 22 (Test step 21 deleted)	

Trouble-shooting:

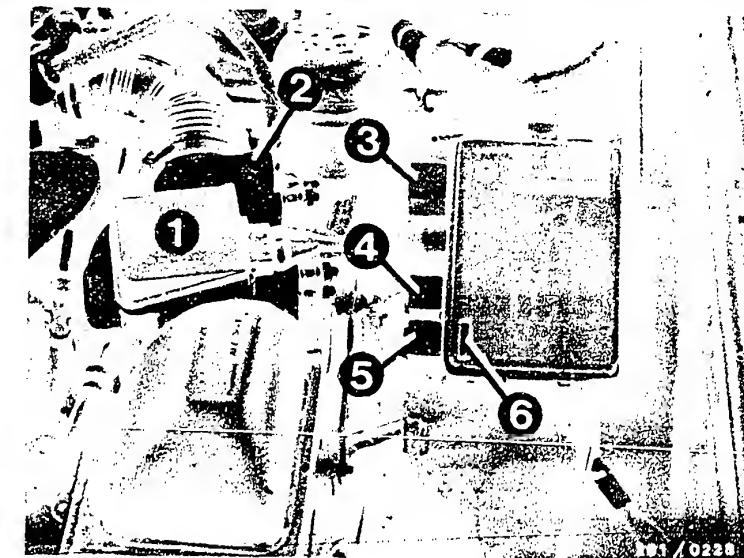
1. Voltage less than 10 V: Battery insufficiently charged or high voltage drops at terminals.

2. No voltage reading: check relay 2.

Perform the following voltage measurements on the relay with the ignition on.

- Measure battery voltage at Term. 87 (2x), Term. 86 and Term. 30.
- Measure ground connection Term. 85 against B+ (test adapter connected).
- Check lead from relay 2 Term. 87 to multiple plug Term. 35.

Note: If replacing relay 2, make sure that only relay with blocking diode is installed. Note symbol on relay housing.



4=Relay 1 (pump relay)
5=Relay 2 (main relay)

Arrow=Motronic ground terminal



E10

Test with universal test adapter

BMW 525e



E11

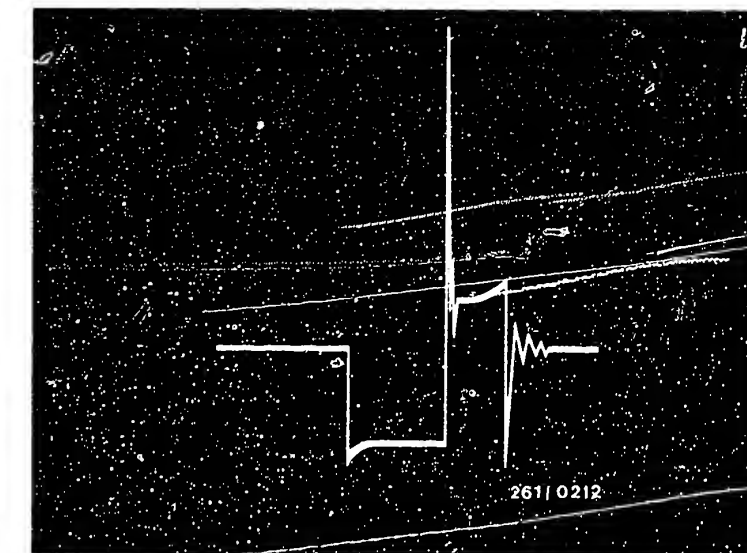
Test with universal test adapter

BMW 525e



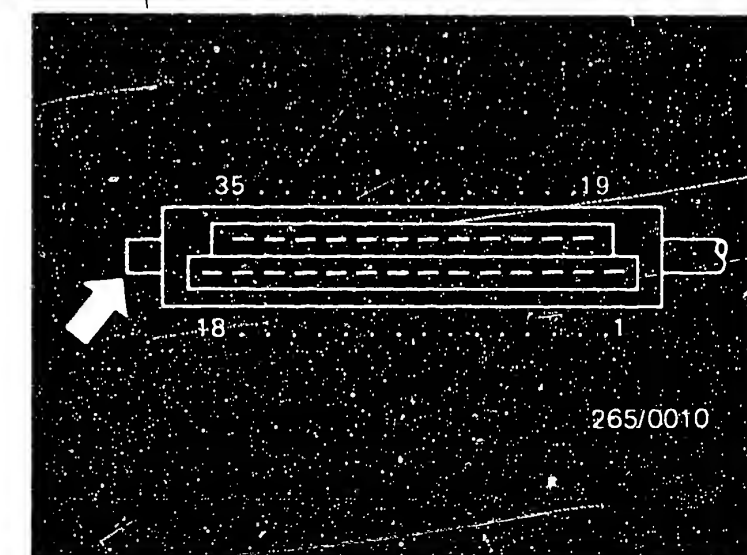
Test step 22 Ignition off. Connect control unit. Test chart applies only to control unit 0 261 200 042 and ..045 (Austria)

Operation	Reading	Testing
Program switch position "V"	5	<u>Component:</u> Ignition-coil, H.T. ignition cables, control unit
Program switch position "Ω"	15	
<u>Measuring equipment:</u> Motortester, oscilloscope	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> yes ↓ Continue testing with next test step. </div> <div style="text-align: center;"> no ↓ </div> </div>	<u>Operation:</u> Primary signal from ignition coil terminal 1 to ground
<u>Measuring range:</u> Special input		<u>Malfunction:</u> No signal or incorrect signal.
<u>Connection:</u> Test wells; red clip to red well, black clip to black well, triggering on cylinder 1		
<u>Operation in vehicle:</u> Shift gear to neutral and operate starting motor		



Primary signal

Top view of control unit plug (35-pin) with terminal numbers. Arrow="Lug" with mechanical encoding.



Trouble-shooting:

- Check Motronic - ground terminals:
The terminal points must be bare metal and the screws must be tightened firmly.
- Check the ignition coil, including the leads and the high voltage leads.
It must not be possible to shove back the spring contact on the multiple plug Term. 1.
- Check the lead from ignition coil Term. 15 to the ignition lock Term. 15.
- Take out and replace the control unit.

E12

Test with universal test adapter
BMW 525e

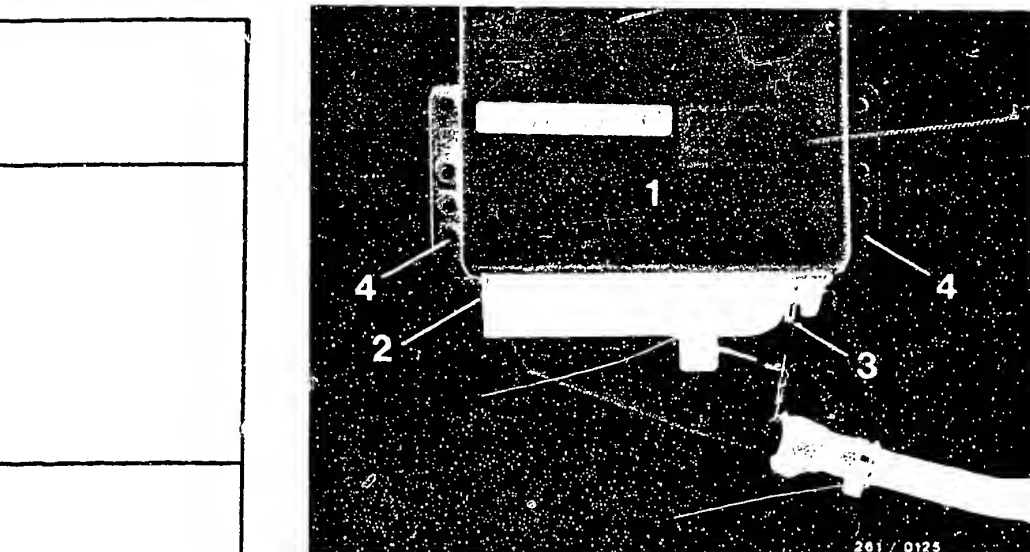


E13

Test with universal test adapter
BMW 525e



Test step 23			
Operation		Reading	Testing
Program switch position "V"	8	Multimeter must indicate greater than 8 V	<u>Component:</u> Control unit
Program switch position "Ω"	15		
<u>Measuring equipment:</u> Multimeter (range-V)		<div><div></div><div>yes</div><div>Continue testing with next test step.</div></div> <div><div></div><div>no</div><div></div></div>	<u>Operation:</u> Supply voltage for air-flow sensor at terminal 9 and ground
<u>Measuring range:</u> 15 V			
<u>Connection:</u> Test sockets, (red = +, black = Ground)	V		
<u>Operation in vehicle:</u> Switch on ignition			
			<u>Malfunction:</u> Voltage less than 8 V



- 1 = Control unit
- 2 = Locating lug
- 3 = Detent
- 4 = Mounting holes

Trouble-shooting:

- Replace control unit

Note

In order to rule out any confusion between the control units of the various systems, a mechanical locking device has been introduced. The "locating lug" (pivot point when opening and connecting the control unit) and the corresponding mounting point on the control unit have matching recesses and pins.

E14

Test with universal test adapter

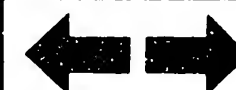
BMW 525e



E15

Test with universal test adapter

BMW 525e



Test step 24			
Operation		Reading	Testing
Program switch position "V"	9	Multimeter must indicate <u>100... 250 mV</u> with air-flow sensor flap closed. Remove hose from air- flow sensor on air fil- ter side and open sen- sor flap by hand. Sensor flap must not catch and must return automati- cally to its rest posi- tion when released. With the sensor flap fully open the reading rises to above <u>7 V</u> (change to different measuring range).	<u>Component:</u> Air-flow sensor
Program switch position "N"	15		
Measuring equipment: Multimeter (range-V)			<u>Operation:</u> Divider voltage at terminal 7 and ground
Measuring range 1.5 V		<div><div>yes</div><div>no</div></div>	<u>Malfunction:</u> No voltage or voltage less than 100 mV
Connection: Test sockets (red = +, black = ground) V			
Operation in vehicle: Switch on ignition			

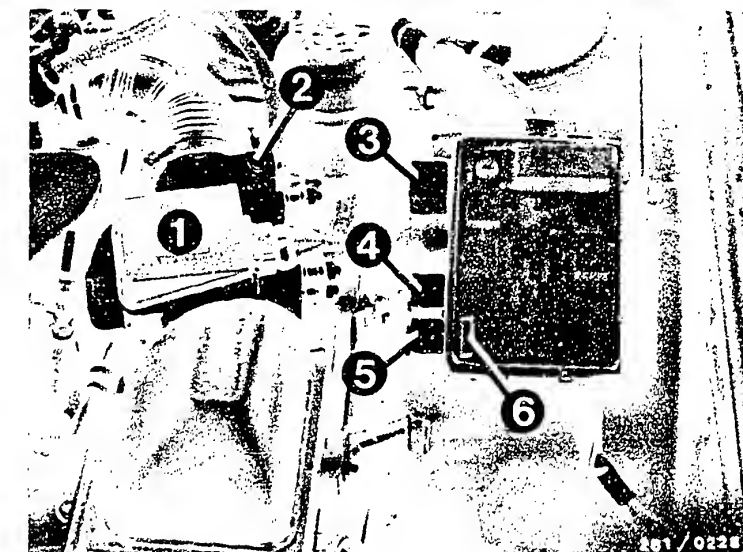
Trouble-shooting:

No reading:

- Check leads from air-flow sensor Term. 6, 7 and 9 to control unit plug Term. 6, 7 and 9.
- Spring contact must not allow themselves to be pushed back.

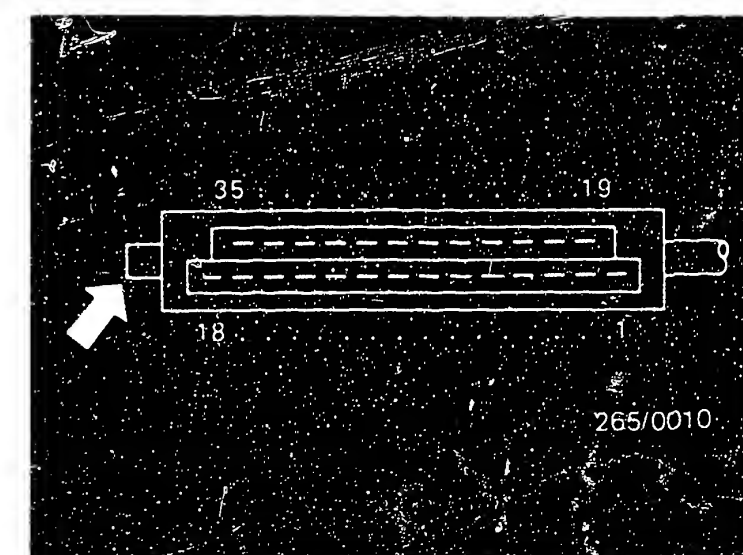
Reading outside tolerance:

- Check whether air-flow sensor flap is closing fully.
- Replace air-flow sensor.



1=Air-flow sensor with NTC I
2=Idle-mixture-adjusting screw

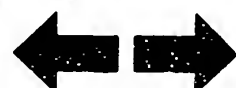
Top view of control unit
plug (35-pin) with
terminal numbers.
Arrow="Lug" with mechanical
encoding.



E16

Test with universal test adapter

BMW 525e



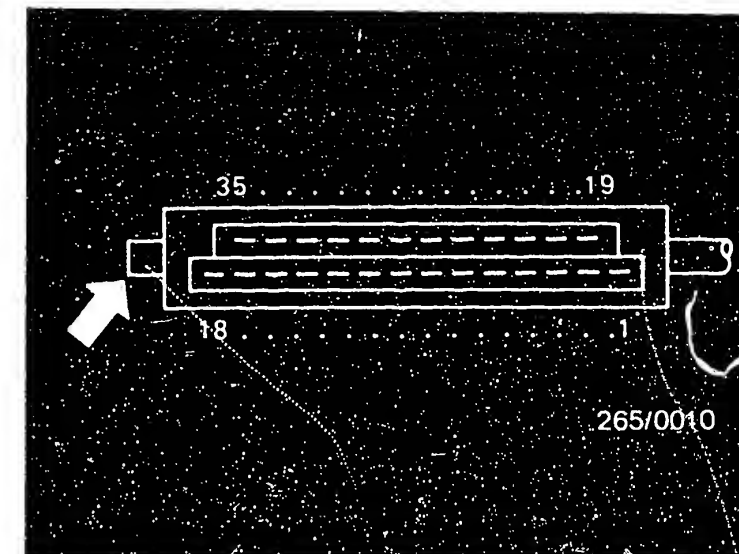
E17

Test with universal test adapter

BMW 525e



Test step 27 (Test steps 25 and 26 deleted)			
Operation		Reading	Testing
Program switch position "V"	12	Multimeter must indicate 8 ... 15 V during starting.	<u>Component:</u> Lead 4 from starting motor Term. 50 to control unit plug Term. 4
Program switch position "N"	15		
<u>Measuring equipment:</u> Multimeter (range-V)			
<u>Measuring range:</u> 15 V		<div>yes</div> <div>no</div>	<u>Operation:</u> Voltage test at terminal 4
Connection: Test sockets (red = +, black = ground)	V		<u>Malfunction:</u> Voltage less than 8 V
<u>Operation in vehicle:</u> Shift gear to neutral and operate starting motor.			<u>Continue testing with next test step.</u>



Top view of control unit
plug (35-pin) with
terminal numbers.
Arrow="Lug" with mechanical
encoding.

Trouble-shooting:

1. Voltage less than 8 V:

- Test voltage drop at starting motor terminal 50.
- Check lead from control unit plug Terminal 4 to starting motor terminal 50.

E18

Test with universal test adapter
BMW 525e

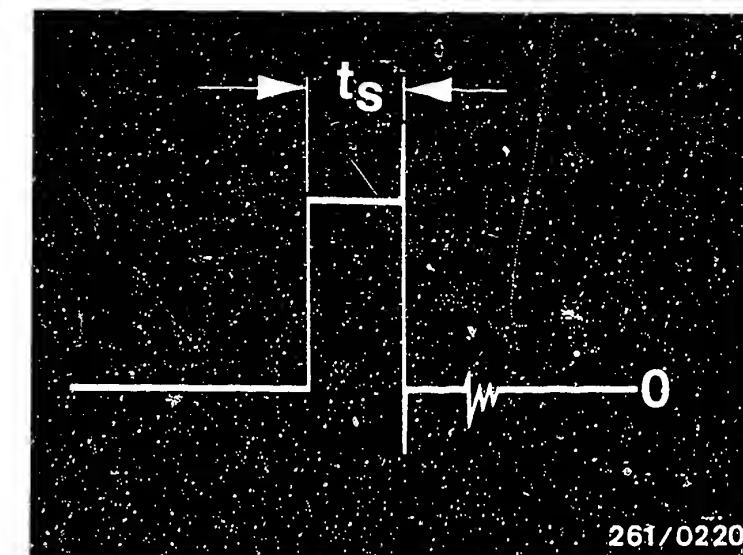


E19

Test with universal test adapter
BMW 525e



Test step 28		
Operation	Reading	Testing
Program switch position "V"	13	Dwell period signal (see figure at top)
Program switch position "Ω"		
Measuring equipment: Motortester, oscilloscope	15	Component: Control unit
Measuring range: Special input		
Connection: Test wells; red clip to red well, black clip to black well	<div> <div>yes</div> <div>no</div> </div>	Operation: Dwell-period signal at terminal 21 and ground
Operation in vehicle: Shift gear to neutral and operate starting motor		
	<div> <div>Continue testing with next test step.</div> </div>	Malfunction: No signal



t_s = Dwell period

0 = Base line

Trouble-shooting:

- Replace control unit

Note:

In order to rule out any confusion between the control units of the various systems, a mechanical locking device has been introduced. The "locating lug" (pivot point when opening and connecting the control unit) and the corresponding mounting point on the control unit have matching recesses and pins

E20

Test with universal test adapter

BMW 525e



E21

Test with universal test adapter

BMW 525e



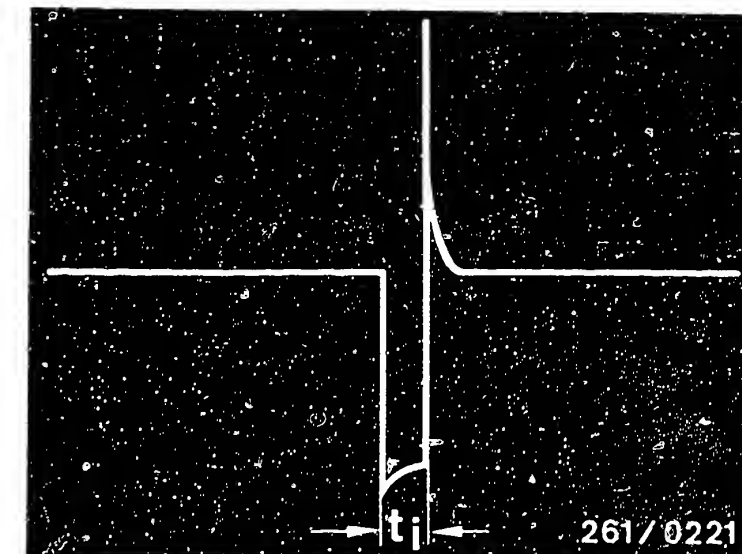
Test step 29			
Operation		Reading	Testing
Program switch position "V"	14	Fuel-injection signal (see figure at top)	<u>Component:</u> Power supply for solenoid-operated injection valves, control unit
Program switch position "N"	15		
<u>Measuring equipment:</u> Motortester, oscilloscope		<div><div></div><div>yes</div><div>↓</div><div>Continue testing with next test step.</div></div> <div>no</div> <div>↓</div> <div></div>	<u>Operation:</u> Injection output stage at terminal 14 and ground
<u>Measuring range:</u> Special input			<u>Malfunktion:</u> No signal
<u>Connection:</u> Test wells; red clip to red well, black clip to black well			
<u>Operation in vehicle:</u> Shift gear to neutral and operate starting motor			

Trouble-shooting:

- Check power supply to injection valves:
Remove connector from all solenoid-operated injection valves and measure voltage to ground at both terminals. Battery voltage must be measured at each solenoid-operated injection valve connector.
If no voltage present, check leads from solenoid-operated injection-valve connectors to main relay Term. 87.
- Check lead from control unit plug Term. 14 to injection valves of cylinders 1, 2 and 3.
- Replace control relay.

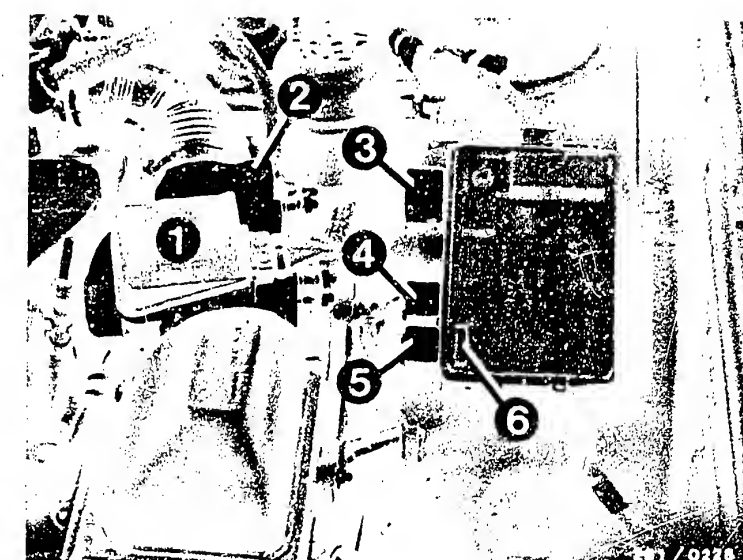
Note:

In order to rule out any confusion between the control units of the various systems, a mechanical locking device has been introduced. The "locating lug" (pivot point when opening and connecting the control unit) and the corresponding mounting point on the control unit have matching recesses and pins.



Fuel-injection signal
 t_i = Fuel injection period

4=Relay 1 (pump relay)
 5=Relay 2 (main relay)



E22

Test with universal test adapter

BMW 525e



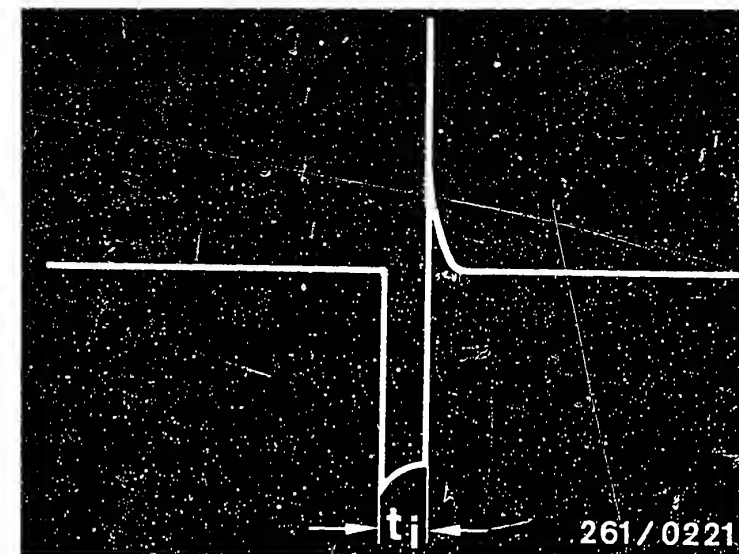
E23

Test with universal test adapter

BMW 525e

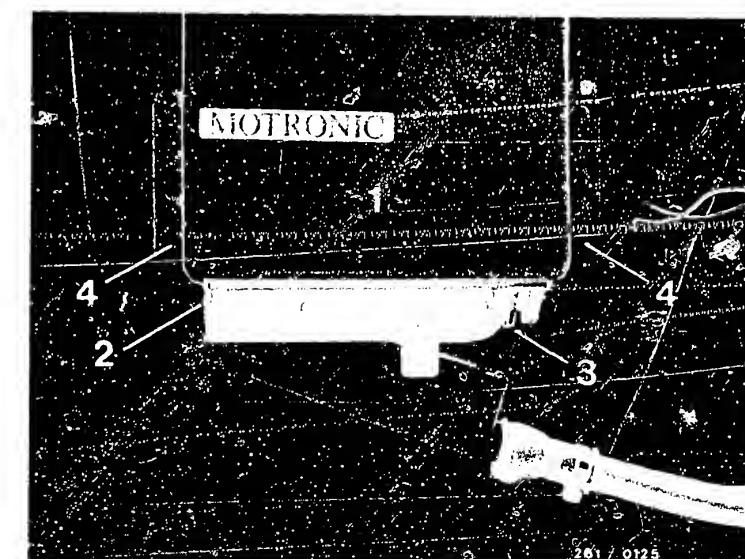


Test step 30			
Operation		Reading	Testing
Program switch position "V"	14	Duration of injection t_i becomes slightly longer after pressing button T1 (NTC II, cold). <u>Only press T1 briefly; otherwise mixture will be too rich for engine.</u>	<u>Component:</u> Control unit
Program switch position "Ω"			
<u>Measuring equipment:</u> Motortester, oscilloscope		<div><div>yes</div><div>↓</div><div>Continue testing with next test step.</div></div> <div><div>no</div><div>↓</div></div>	<u>Operation:</u> Influence of temperature
<u>Measuring range:</u> Special input			<u>Malfunction:</u> Signal does not become wider after pressing button T1
<u>Connection:</u> Test wells; red clip to red well, black clip to black well			
<u>Operation in vehicle:</u> Shift gear to neutral and operate starting motor			
<u>Button:</u> Press T1			



Fuel-injection signal
 t_i = Fuel-injection period

- 1 = Control unit
- 2 = Locating lug
- 3 = Detent
- 4 = Mounting holes



Trouble-shooting:

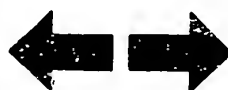
Replace control unit

Note:

In order to rule out any confusion between the control units of the various systems, a mechanical locking device has been introduced. The "locating lug" (pivot point when opening and connecting the control unit) and the corresponding mounting point on the control unit have matching recesses and pins.

F1

Test with universal test adapter
 BMW 525e

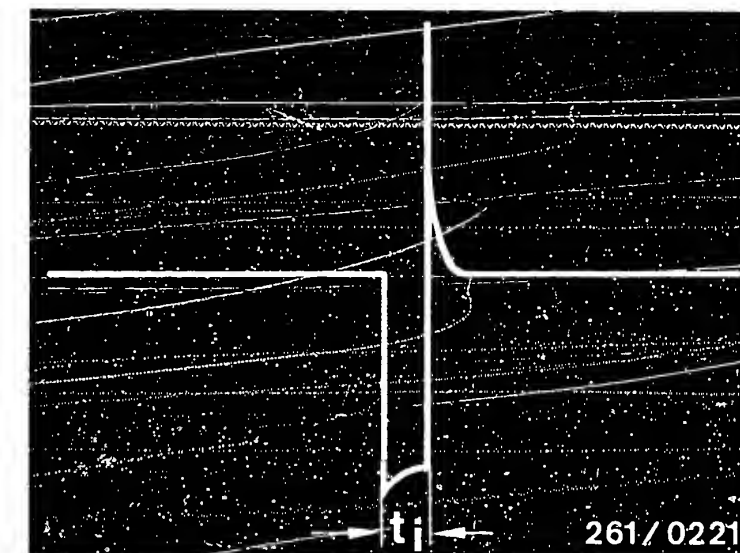


F2

Test with universal test adapter
 BMW 525e

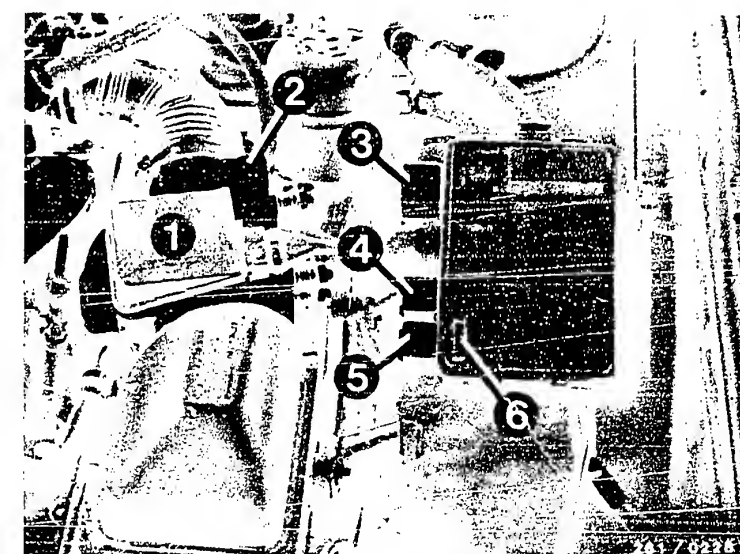


<u>Test step 31</u>		<u>Reading</u>	<u>Testing</u>
<u>Operation</u>			
<u>Program switch position</u> "V"	15	<u>Fuel-injection signal</u> (see figure at top)	<u>Component:</u> Control unit
<u>Program switch position</u> "Ω"	15		
<u>Measuring equipment:</u> Motortester, oscilloscope			
<u>Measuring range:</u> Special input		<div><div>yes</div><div>no</div></div>	<u>Operation:</u> Injection output stage at terminal 15 and ground
<u>Connection:</u> Test wells; red clip to red well, black clip to black well			
<u>Operation in vehicle:</u> Shift gear to neutral and operate starting motor			<u>Malfunktion:</u> No signal
		<u>Continue testing with next test step.</u>	



Fuel-injection signal
 t_i = Fuel-injection period

4=Relay 1 (pump relay)
5=Relay 2 (main relay)



Trouble-shooting:

- Check power supply to injection valves:
Remove connector from all solenoid-operated injection valves and measure voltage to ground at both terminals. Battery voltage must be measured at each solenoid-operated injection valve connector. If no voltage, check lead via plug-in connection Term. 2 to relay set Term. 87.
- Check lead from control unit plug Terminal 15 to the electric fuel-injection valves of cylinders 4, 5, and 6 via plug connection Term. 6.
- Replace control unit.

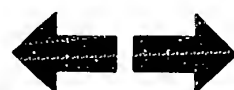
Note:

In order to rule out any confusion between the control units of the various systems, a mechanical locking device has been introduced. The "locating lug" (pivot point when opening and connecting the control unit) and the corresponding mounting point on the control unit have matching recesses and pins.

F3

Test with universal test adapter

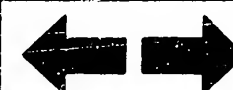
BMW 525e



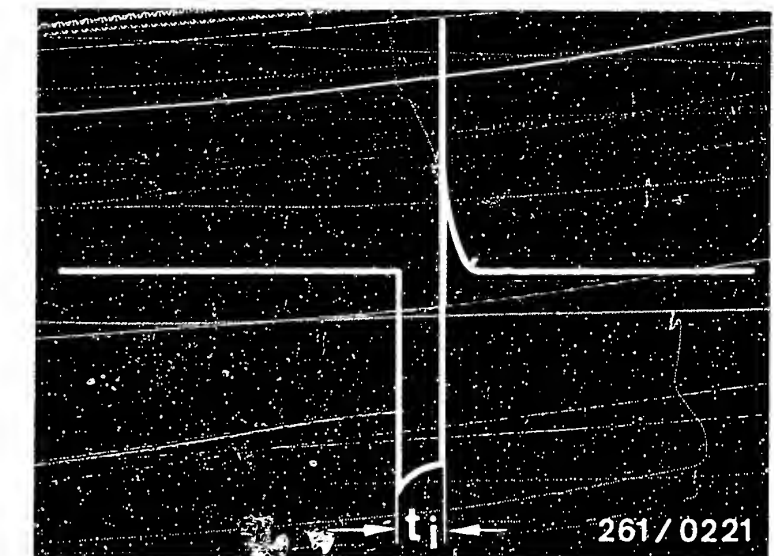
F4

Test with universal test adapter

BMW 525e

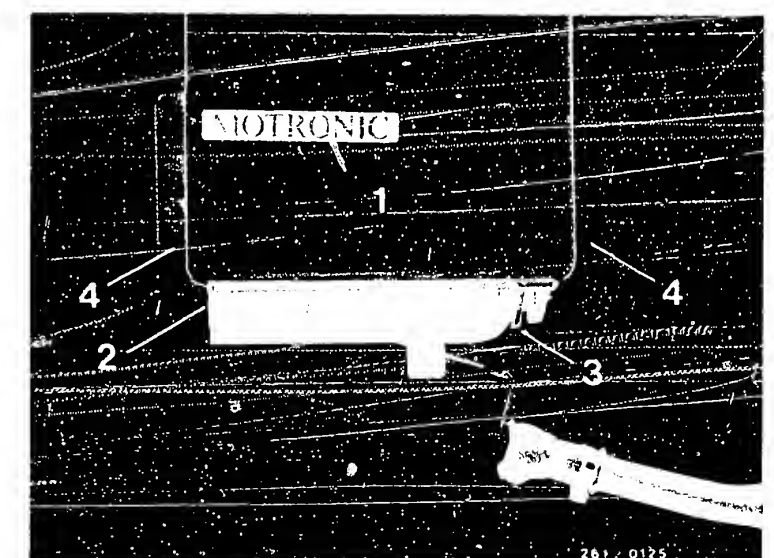


Test step 32			
Operation		Reading	Testing
Program switch position "V"	16	Fuel-injection signal (see figure at top)	Component: Control unit
Program switch position "Ω"	15		
Measuring equipment: Motortester, oscilloscope			Operation: Injection signal at terminal 11 and ground
Measuring range: Special input		<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> yes ↓ </div> <div style="text-align: center;"> no ↓ </div> </div>	Malfunction: No signal
Connection: Test wells; red clip to red well, black clip to black well			
Operation in vehicle: Shift gear to neutral and operate starting motor		Continue testing with next test step.	



Fuel-injection signal
 t_i = Fuel-injection period

- 1 = Control unit
- 2 = Locating lug
- 3 = Detent
- 4 = Mounting holes



Trouble-shooting:

Replace control unit.

Note:

In order to rule out any confusion between the control units of the various systems, a mechanical locking device has been introduced. The "locating lug" (pivot point when opening and connecting the control unit) and the corresponding mounting point on the control unit have matching recesses and pins

F5

Test with universal test adapter

BMW 525e

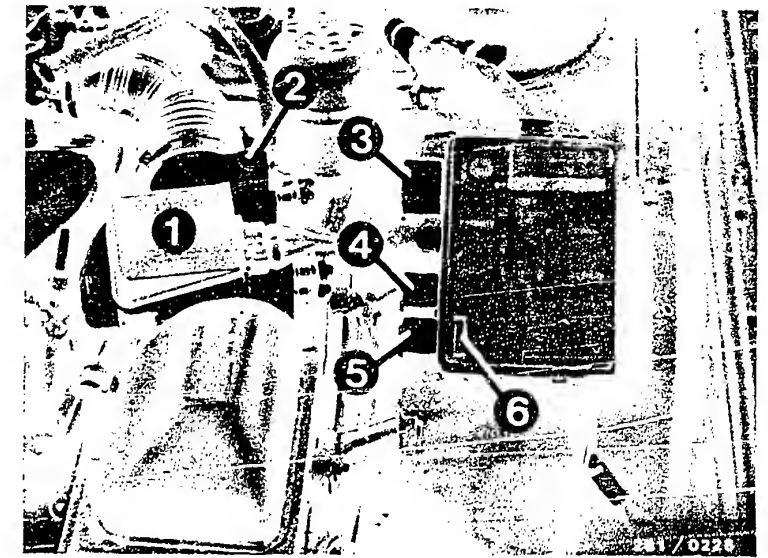


F6

Test with universal test adapter

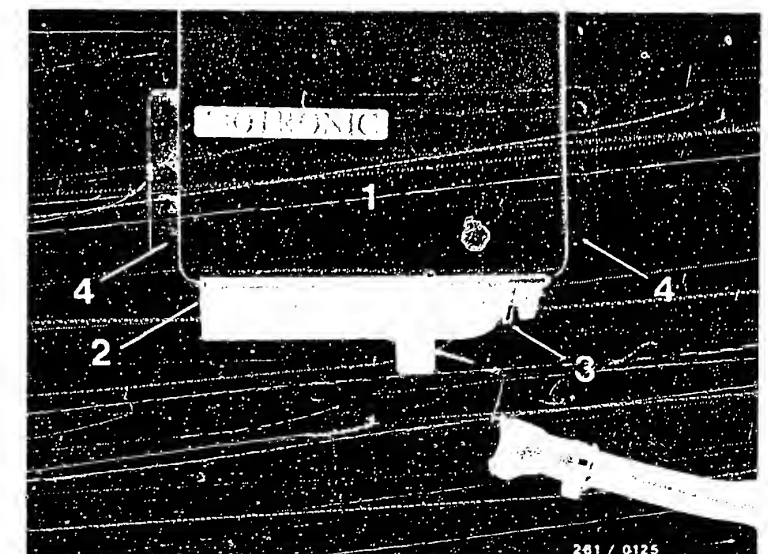
BMW 525e





4=Relay 1 (pump relay)
5=Relay 2 (main relay)

1 = Control unit
2 = Locating lug
3 = Detent
4 = Mounting holes



Operation		Reading	Testing
<u>Program switch position</u> "V"	17	Multimeter must indicate <u>10...15 V</u>	<u>Component:</u> Relay 1 (pump relay)
<u>Program switch position</u> "Ω"	15		
<u>Measuring equipment:</u> Multimeter (range-V)		<div><div>yes</div><div>no</div></div>	<u>Operation:</u> Voltage at Term. 20 to ground
<u>Measuring range:</u> 15 V			
<u>Connection:</u> Test sockets; (red = +, black = ground)	V		<u>Malfunction:</u> Voltage less than 10 V
<u>Operation in vehicle:</u> Switch on ignition.			
		<u>Continue testing with next test step.</u>	

Trouble-shooting:

- Replace relay 1.
- Check lead from control unit plug Term. 20 to relay 1 Term. 85.
- Replace control unit.

Note:

In order to rule out any confusion between the control units of the various systems, a mechanical locking device has been introduced. The "locating lug" (pivot point when opening and connecting the control unit) and the corresponding mounting point on the control unit have matching recesses and pins.

F7

Test with universal test adapter
BMW 525e



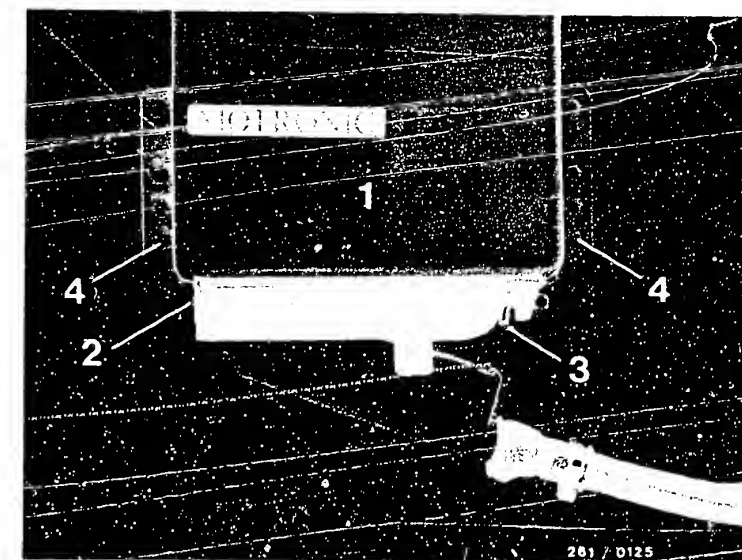
F8

Test with universal test adapter
BMW 525e



Test step 34

Operation		Reading	Testing
Program switch position "V"	17	Multimeter must indicate <u>max. 4 V</u>	<u>Component:</u> Control unit
Program switch position "Ω"	15		
<u>Measuring equipment:</u> Multimeter (Ω range)			
<u>Measuring range:</u> 15 V			
Connection: Test sockets; (red = +, black = ground)	V	<div><div>yes</div><div>no</div></div>	<u>Operation:</u> Pump control Term. 20 to ground
<u>Operation in vehicle:</u> Shift gear to neutral and operate starting motor		<u>Continue testing with next test step.</u>	<u>Malfunction:</u> Voltage greater than 4 V



- 1 = Control unit
- 2 = Locating lug
- 3 = Detenting
- 4 = Mounting holes

Trouble-shooting:

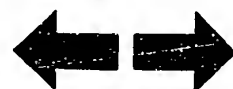
Replace control unit

Note:

In order to rule out any confusion between the control units of the various systems, a mechanical locking device has been introduced. The "locating lug" (pivot point when opening and connecting the control unit) and the corresponding mounting point on the control unit have matching recesses and pins.

F9

Test with universal test adapter
BMW 525e



F10

Test with universal test adapter
BMW 525e



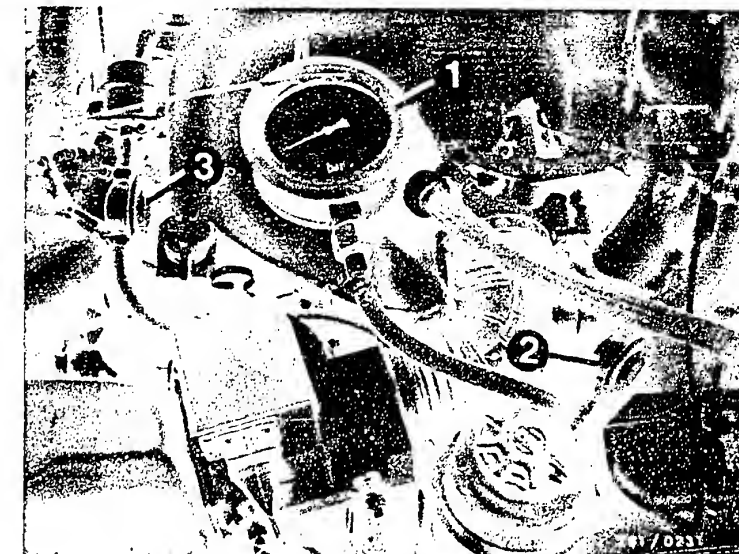
Test step 35 Switch off ignition. Connect pressure gauge.

<u>Operation</u>		<u>Reading</u>	<u>Testing</u>
<u>Program switch position</u> "V"	17	Pressure gauge must indicate <u>2.3...2.7 bar</u>	<u>Component:</u> Pump relay, fuel pump, pressure regulator Fuel filter
<u>Program switch position</u> "Ω"	15		
<u>Measuring equipment:</u> Pressure gauge		<div><div></div><div>yes</div><div>↓</div><div>Continue testing with next test step.</div></div> <div><div></div><div>no</div><div>↓</div><div></div></div>	<u>Operation:</u> Fuel pressure
<u>Measuring range:</u> 0 to 6 bar			
<u>Connection:</u> In fuel delivery line			
<u>Operation in vehicle:</u> Switch on ignition			
<u>Button:</u> Press T3			
			<u>Malfunction:</u> No fuel pressure or pressure outside tolerance

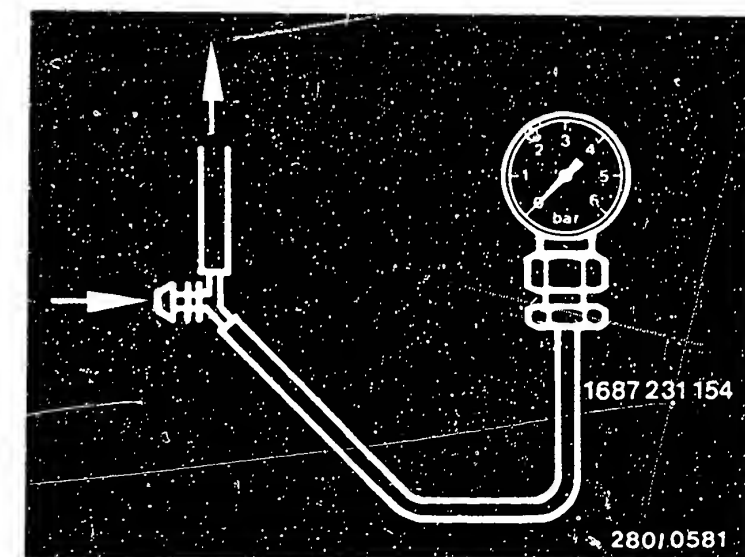
Note:

Install pressure gauge (1) in fuel delivery line to fuel-distribution pipe. Catch any escaping gasoline. Fire hazard with hot engine and electrical sparks.

Continued on F13/F14



- 1=Pressure gauge
- 2=Fuel-line-pressure damper in fuel delivery line
- 3=Fuel-line-pressure damper in fuel return line



F11

Test with universal test adapter
BMW 525e



F12

Test with universal test adapter
BMW 525e



TEST STEP 35 (continued)

If using pressure tester KDJE-P 100 close the hollow screw.

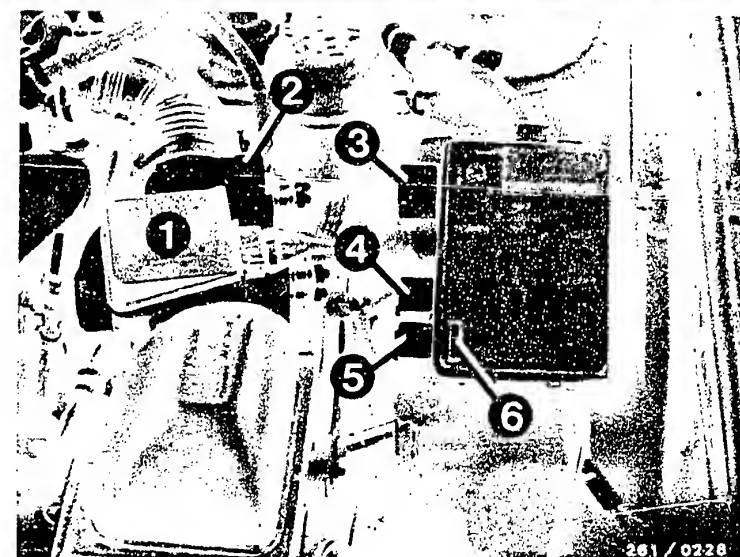
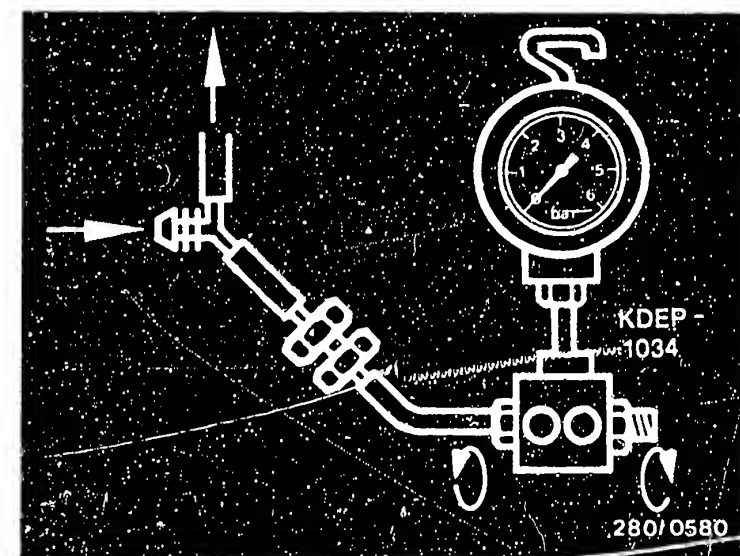
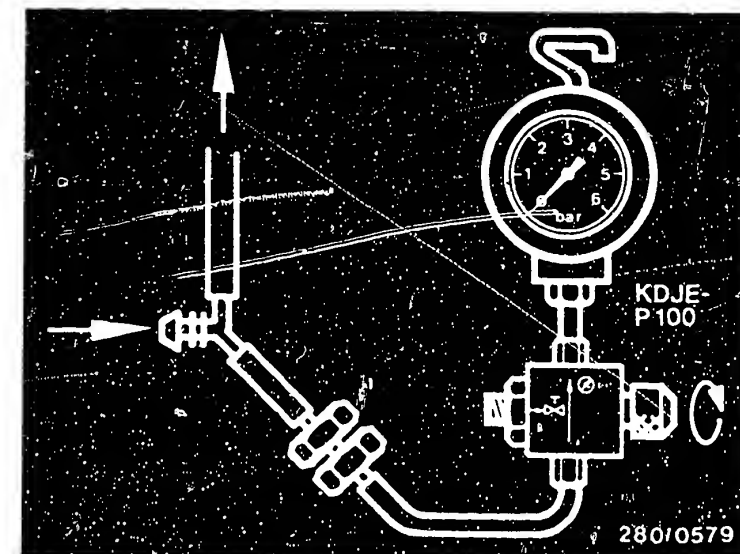
Make sure there are no leaks.

Switch in ignition. Press button T 3 to measure pressure.

1. Pressure 0 bar, no pumping noises can be heard:

- Test pump fuse (4).
- Replace relay 2 (pump relay) (5).

Continued on F15/F16



F13

Test with universal test adapter

BMW 525e



F14

Test with universal test adapter

BMW 525e



Trouble-shooting for TEST STEP 35 (continued)

- Measure voltage at disconnected pump plug.

No voltage:

Check lead from fuel pump to relay 2 term. 87b as well as pump ground lead.

- Voltage present:

Test pressure regulator and fuel pump, as described in 2. below.

2. Fuel pressure below 2.3 bar, fuel pump running:

- Fuel pressure too low:

Slowly pinch off return line with hose clamer. Pressure rises above 4 bar
→ replace pressure regulator.

Pressure remains below 4 bar → replace fuel pump.

- Check fuel line and fuel filter for throughflow. Fuel lines pinched?

- Strainer in tank clogged

- Corrosion in tank

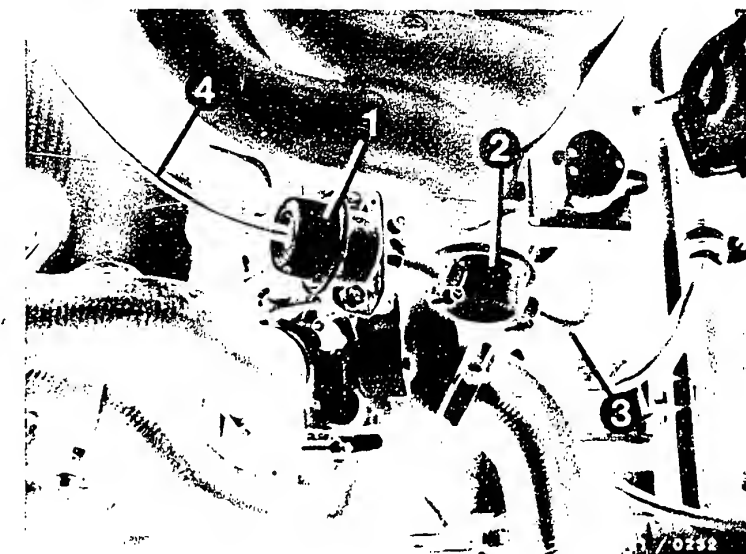
3. Fuel pressure above 2.7 bar:

- Fuel return line clogged or pinched.

- Replace pressure regulator.

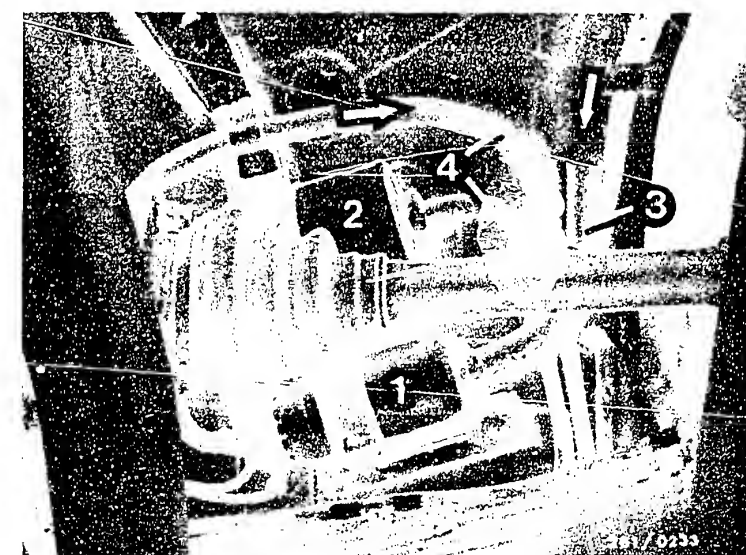
The fuel pressure regulator is mounted on the fuel distribution pipe by means of two fastening screws and one O-ring.

After removing the pressure regulator, it is necessary to replace the O-ring and the flat ring (use parts set 1 287 010 704).



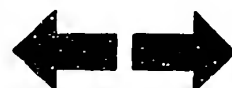
1=Pressure regulator
2=Fuel-line-pressure damper
3=Fuel return hose
4=Air hose to intake manifold

1 = Electric fuel pump
2 = Fuel filter
3 = Fuel intake line
4 = Fuel delivery line
Arrows = Direction of fuel flow



F15

Test with universal test adapter
BMW 525e



F16

Test with universal test adapter
BMW 525e



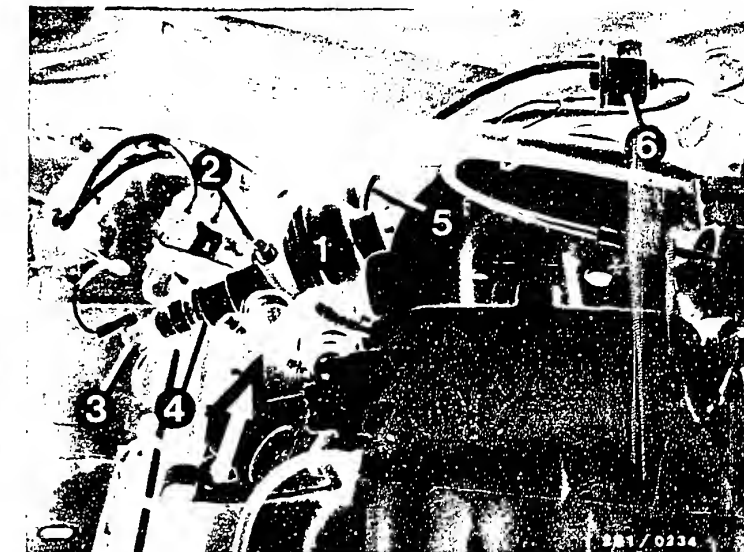
Caution!

The following test steps can be carried out only with the engine running.
If the engine is not running, continue according to the trouble-shooting you have selected.

For detailed trouble-shooting, see C 3 - C 4

For targeted trouble-shooting, see C5 - C10

For further trouble-shooting, leave test adapter, control unit, pressure gauge connected.



- 1=Idle-control valve
- 2=Idle-adjusting screw
- 3=Thermo-servo motor
- 4=Lock nut
- 5=Hose to solenoid-operated valve
- 6=Solenoid-operated valve
- Arrow=Hose to idle-control valve

TEST STEP 36		Connect motortester and CO-Tester.	
Operation		Reading	Testing
Program switch - setting "V"	17	1. With engine at normal operating temp.: Idle speed: 650...750 min ⁻¹ running-up speed: (disconnect hose to solenoid valve and seal) 910...950 min ⁻¹ CO concentration: 0.5...1.5 % by vol. CO 2. Press button T2: readings must not change.	Components: Idle-control valve, engine, leak-tightness of intake system.
Program switch - setting "Ω"	15		
Test equipment: Motortester and CO-Tester			Function: Idle speed and exhaust gas
Range of measurement: Rotational speed and CO		yes ↓ Continue testing with next test step	no ↓ Malfunction: Values not within tolerance
Connection: Ignition coil, exhaust			
Operation in the Vehicle: Have the engine run till it is at normal operating temperature			

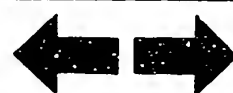
Trouble-shooting:

- Adjust idle speed at idle-speed adjusting screw of idle-control valve.
Setting the running-up speed: disconnect hose to solenoid-operated valve and seal. Loosen lock nut and turn thermo-servo motor until running-up speed is obtained. Re-tighten lock nut.

Continued on F19/F20

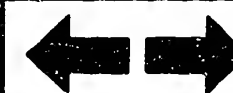
F17

Test with universal test adapter
BMW 525e



F18

Test with universal test adapter
BMW 525e



Trouble-shooting - test step 36 (continued)

- Set exhaust gas with idle-mixture-adjusting screw (hexagon socket head AF5) in air-flow sensor.

To do this, remove the plug in the air-flow sensor. After finishing the adjustment, use a new plug (red).

Turning the idle-mixture-adjusting screw in a clockwise direction:
Increases the CO concentration.

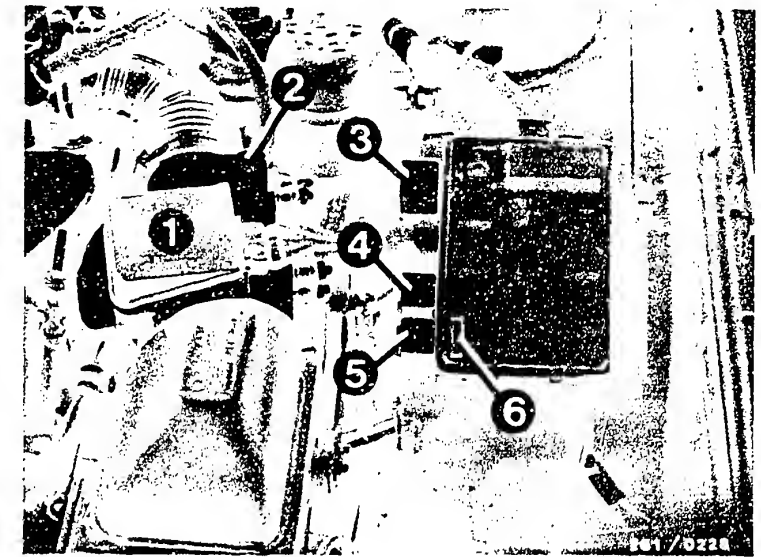
Turning the idle-mixture-adjusting screw in a counterclockwise direction:
Reduces the CO concentration.

CO concentration less than 0,5 % by vol. CO and not adjustable:

Check intake side and exhaust system for leaks (fresh air) by means of pressure test.

Concerning 2.

If the readings change after pressing button T2, the engine is not yet at normal operating temperature.



- 1 = Air-flow sensor with NTC I
2 = Idle-mixture-adjusting screw

F19

Test with universal test adapter
BMW 525e

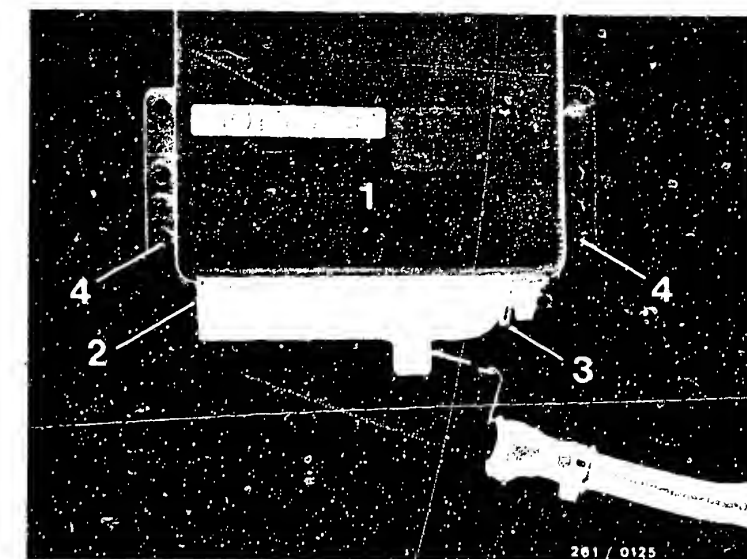


F20

Test with universal test adapter
BMW 525e



Test step 37			
Operation		Reading	Testing
Program switch position "V"	17	1. With the engine at normal operating temperature and at idle speed: 5° ... 15° 2. Press button T6 (full load) and increase rotational speed to 2200 min ⁻¹ . Timing advance angle 7° ... 17° (reading for Austria): 4° ... 14°	Component: Control unit
Program switch position "Ω"	15		
Measuring equipment: Motortester			Operation: Spark advance at idle and at full load
Measuring range: Spark advance			
Connection: Diagnosis cable		yes ↓	Malfunction: Spark advance outside tolerance
Operation in vehicle: Allow engine to reach operating temperature.		no ↓	
		Continue testing with next test step.	



- 1 = Control unit
- 2 = Locating lug
- 3 = Detent
- 4 = Mounting holes

Trouble-shooting:

- Concerning 1. (above): Check idle speed accurately once again, and repeat test step. Idle speed must be between 650 and 750 min⁻¹, otherwise a different spark advance will be indicated.
- Concerning 2.: Bring engine up to stated engine speed once again and read off spark advance
- Replace control unit

Note:

In order to rule out any confusion between the control units of the various systems, a mechanical locking device has been introduced. The "locating lug" (pivot point when opening and connecting the control unit) and the corresponding mounting point on the control unit have matching recesses and pins.

- On control unit 0 261 200 045 for Austria the PCB switch is set as standard to position 4. Otherwise control units 0 261 200 042 and ... 045 are identical.

F21

Test with universal test adapter
BMW 525e

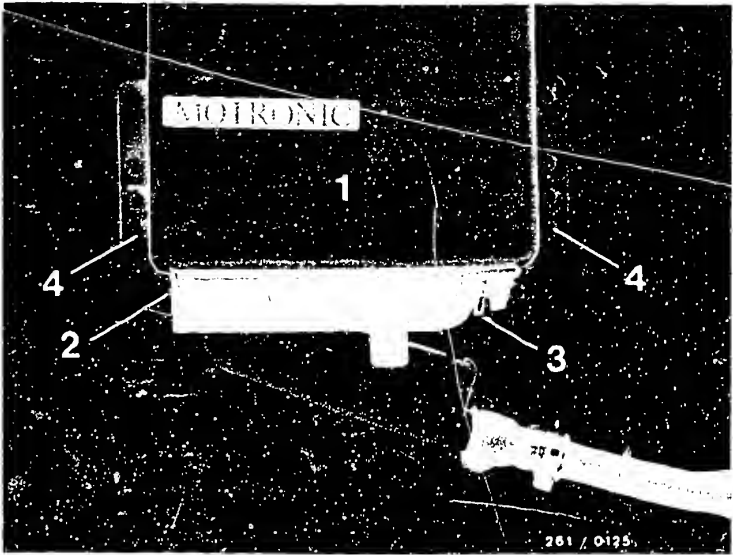


F22

Test with universal test adapter
BMW 525e



Test step 38			
Operation		Reading	Testing
<u>Program switch position</u> "V"	17	1. With engine at normal operating temperature and at idle speed: 6°...18° 2. At 3000 min ⁻¹ 22°...42°	<u>Component:</u> Control unit
<u>Program switch position</u> "Ω"	15		
<u>Measuring equipment:</u> Motortester			
<u>Measuring range:</u> Dwell angle			<u>Operation:</u> Dwell angle
<u>Connection:</u> Ignition coil		yes ↓	<u>Malfunction:</u> Dwell angle outside tolerance
<u>Operation in vehicle:</u> Let engine run		Continue testing with next test step. ↓	



- 1 = Control unit
- 2 = Locating lug
- 3 = Detent
- 4 = Mounting holes

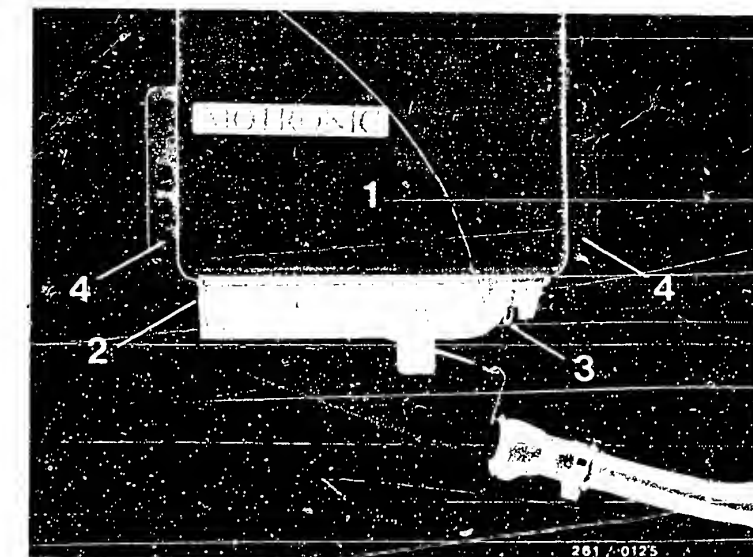
Trouble-shooting:

Replace control unit

Note:

In order to rule out any confusion between the control units of the various systems, a mechanical locking device has been introduced. The "locating lug" (pivot point when opening and connecting the control unit) and the corresponding mounting point on the control unit have matching recesses and pins.

Test step 39			
Operation		Reading	Testing
<u>Program switch "V"</u> at position:	17	Engine at normal operating temperature Engine speed 2000 min ⁻¹ (keep accelerator in same position). Press button T5:	<u>Component:</u> Control unit
<u>Program switch "Ω"</u> at position:	15		
<u>Measuring equipment:</u> Motortester		<u>Engine "hunts"</u> i.e. Engine speed drops to approx. 900 - 1200 min ⁻¹ . Engine speed then rises again and drops again etc.	<u>Operation:</u> Cutting off of injection pulses (overrun cutoff)
<u>Measuring range:</u> Engine speed			
<u>Connection:</u> Ignition coil		<div><div>yes</div><div>no</div></div>	
<u>Operation in vehicle:</u> Let engine run			
<u>Button:</u> Press T5		<u>Malfunction:</u> No cutoff	
		<div><div>Continue testing with next test step.</div><div></div></div>	



- 1 = Control unit
- 2 = Locating lug
- 3 = Detent
- 4 = Mounting holes

Trouble-shooting:

Replace control unit

Note:

In order to rule out any confusion between the control units of the various systems, a mechanical locking device has been introduced. The "locating lug" (pivot point when opening and connecting the control unit) and the corresponding mounting point on the control unit have matching recesses and pins.

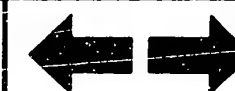
G1

Test with universal test adapter
BMW 525e



G2

Test with universal test adapter
BMW 525e



Testing with the Universal test adapter is now completed.
If the fault has not been found or if you require
further information and instructions on how to remedy
the fault, continue with the trouble-shooting program
of your choice.

Detailed trouble-shooting → see C 3-C 4

Direct trouble-shooting → see C 5-C10

G3

Test with universal test adapter

BMW 525e



STARTING MOTOR OPERATES, ENGINE FAILS TO START OR STARTS ONLY WITH GREAT DIFFICULTY

Trouble-shooting program according to customer complaints

How to use the following trouble-shooting program

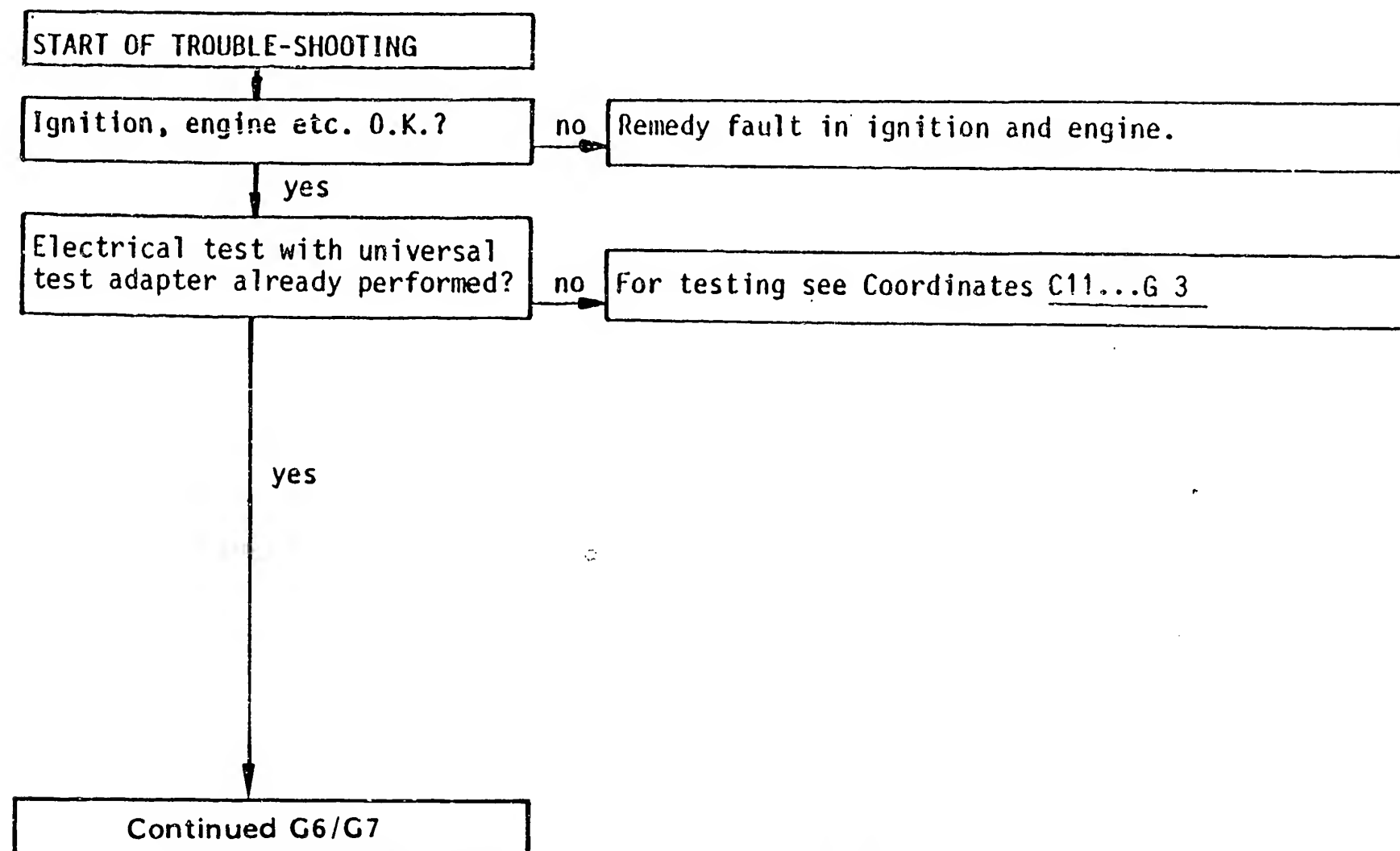
The program is divided into three rows of boxes:

- The left-hand row contains the questions on the tests.
- The middle row contains descriptions of the testing and adjustment operations on the components.
- The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.



G4

Engine fails to start
BMW 525e



G5

Engine fails to start
BMW 525e



Starting motor operates, engine fails to start or starts only with great difficulty
(continued)

yes

Check secondary pattern of all cylinders at cranking speed. Secondary pattern O.K.?

no

Check ignition coil and high-voltage section:
Distributor cap oil-fouled inside and outside?
(Remove distributor rotor and check camshaft seal).
Note:

Distributor cap fastened with 3 screws. To remove the distributor cap, remove the radiator cover.

When connecting the H.T. ignition cables note the cylinder numbers. Do not forget the hood and screening cover. Check the primary side of the ignition coil for continuity (approx. 0Ω).
Secondary resistance: 5 to 7.2 k Ω . Check interference-suppression resistors, H.T. ignition cables and spark plugs.

Interference-suppression resistor in

Distributor rotor:	1 k Ω
Distributor domes:	1 k Ω each
Spark-plug connector:	5 k Ω each
Spark plugs:	0 k Ω
Ignition coil:	1 k Ω

yes

While cranking, feel all injection valves by hand.
Can needle movement be felt on all valves?

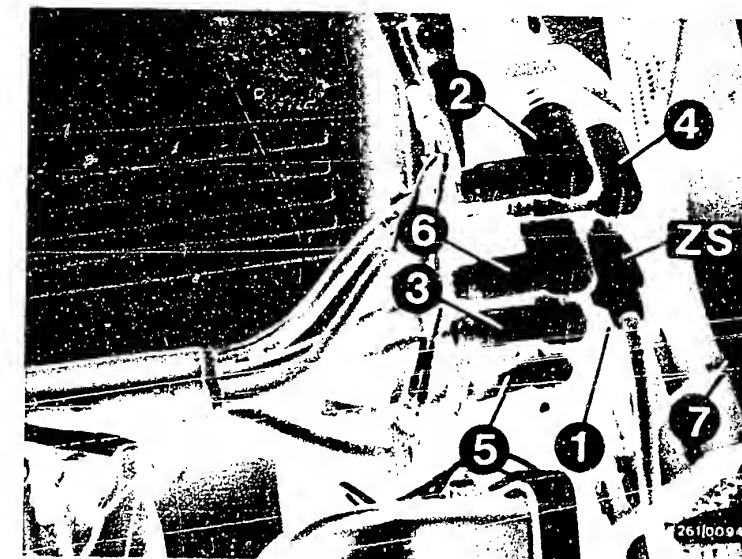
no

Test injection valve with ohmmeter.
Test specification: 15...17,5 k Ω
Replace injection valve if defective.

yes

Continued on G12/G13

Continued on G8/G9



High-voltage distributor

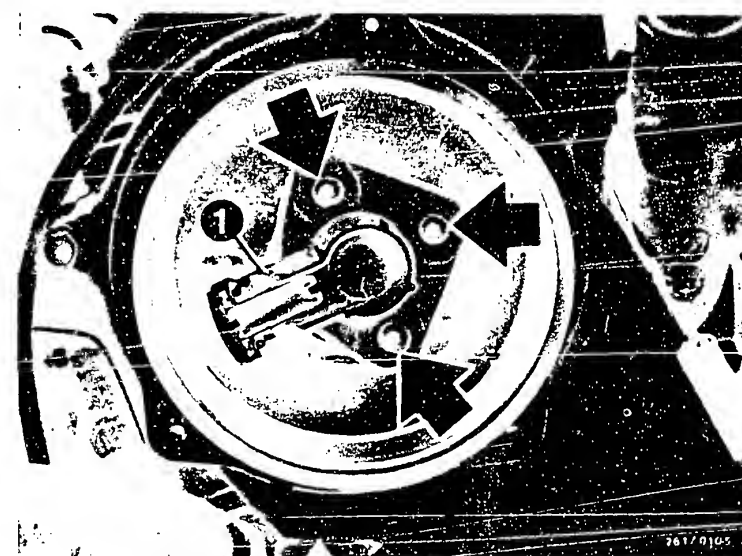
1 to 6 = cylinder numbers

ZS = High-tension lead to ignition coil

7 = Radiator cover

1 = Distributor rotor

Arrows = Fastening screws



G6

Engine fails to start

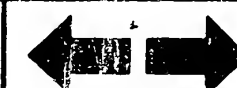
BMW 525e



G7

Engine fails to start

BMW 525e



Starting motor operates, engine fails to start or starts only with great difficulty
(continued)

Removing the solenoid-operated injection valves

Loosen the fastening screws on the fuel-distribution pipe. Pull the fuel-distribution pipe upward until the injection valves are out of the bore in the intake manifold. Do not damage the nozzle needle or rubber seal.

Check the nozzle needle and surrounding area for leaks and deposits.

Remove the electrical connector.

Carefully slide the holding clamps out of the groove and pull the injection valve out of the fuel distribution pipe connection.

Caution

Catch any escaping fuel. Do not allow to drip onto hot parts of the engine. Fire hazard.

Caution

Protection sleeve must not be levered off.

Installation of the injection valves

Damaged or swollen O-rings must be replaced.

Use parts set 1 287 010 704.

Cut through lower O-ring (intake port).

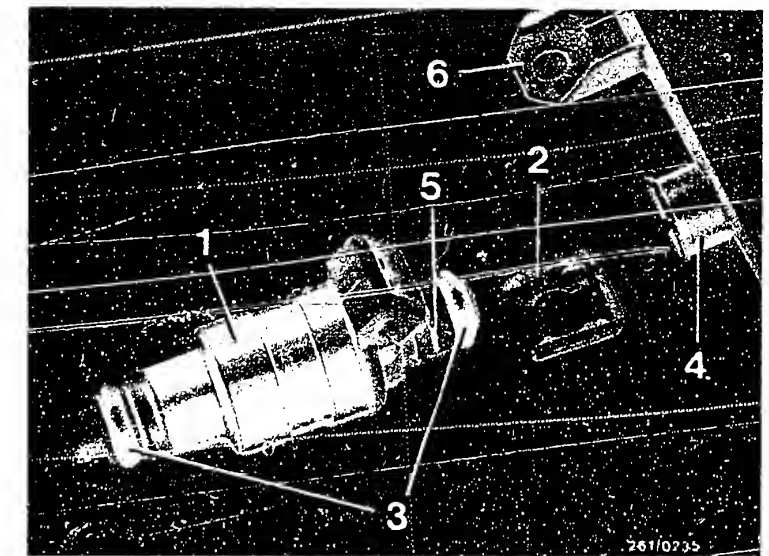
Caution: do not damage protection sleeve.

Fit new O-ring over protection sleeve and its bead. Do not damage any parts.

yes

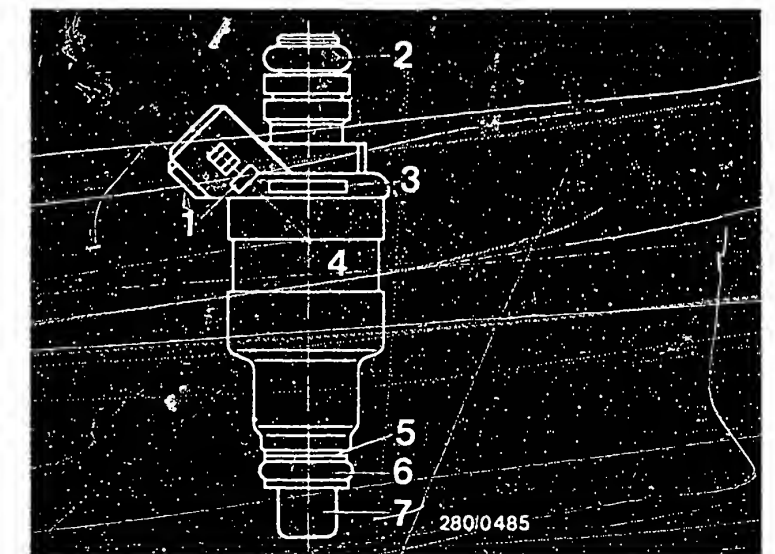
Continued on G12/G13

Continued on G10/G11



- 1=Injection valve
- 2=Holding clamp
- 3=Rubber seal (O-ring)
- 4=Fuel-distribution pipe connection
- 5=Groove
- 6=Fastening strap

- 2=upper O-ring
- 6=lower O-ring
- 7=Protection sleeve



G8

Engine fails to start
BMW 525e



G9

Engine fails to start
BMW 525e

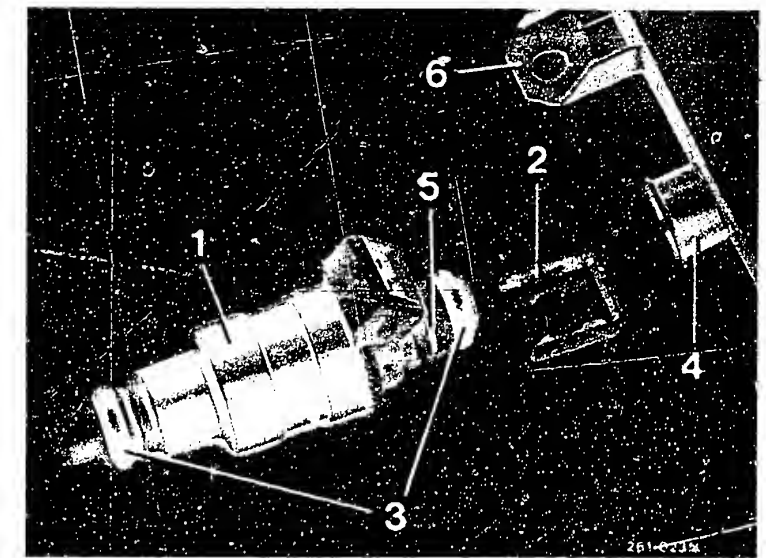


Starting motor operates, engine fails to start or starts only with great difficulty
(continued)

Before installing, check both rubber seals for proper seating.
Mount injection valves on fuel distribution pipe.
Press all 4 injection valves simultaneously into their seats with the fuel-distribution pipe.
Secure the fuel-distribution pipe. Check all air and fuel hoses for security.
Make the electrical connections.
Start the engine and check whether any unmetered air is being drawn in.

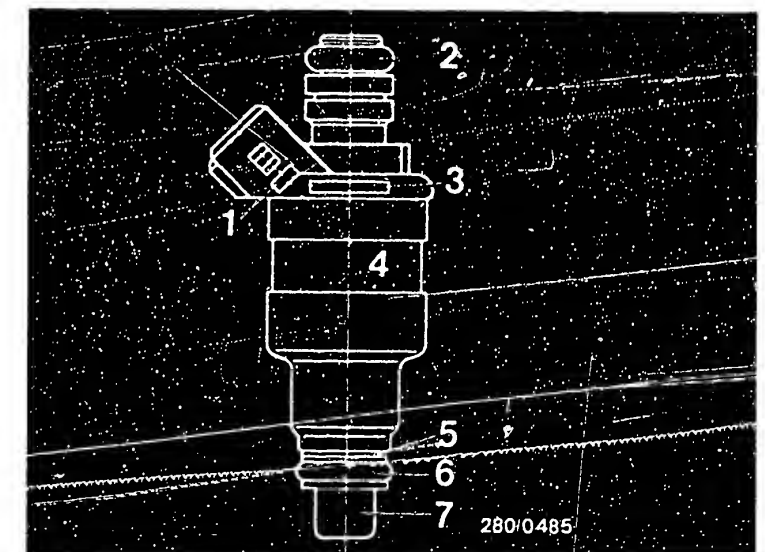
yes

Continued on G12/G13



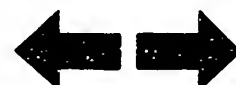
1=Injection valve
2=Holding clamp
3=Rubber seal (O-ring)
4=Fuel-distribution pipe connection
5=Groove
6=Fastening strap

2=upper O-ring
6=lower O-ring
7=Protection sleeve



G10

Engine fails to start
BMW 525e



G11

Engine fails to start
BMW 525e



Starting motor operates, engine fails to start or starts only with great difficulty
(continued)

yes

Electropneumatic idle-speed control (not from Bosch) O.K.?

no

yes

Continued on G18/G19

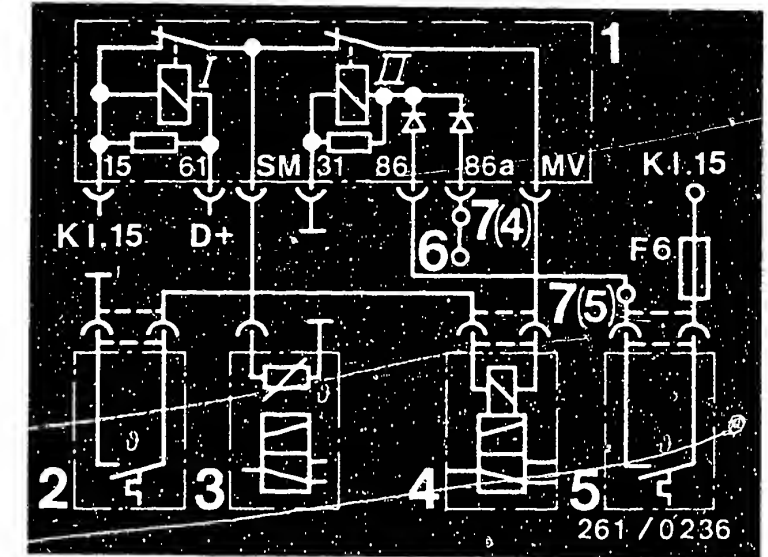
Operating principle of electropneumatic idle-speed control

The idle-speed control consists of the following components:

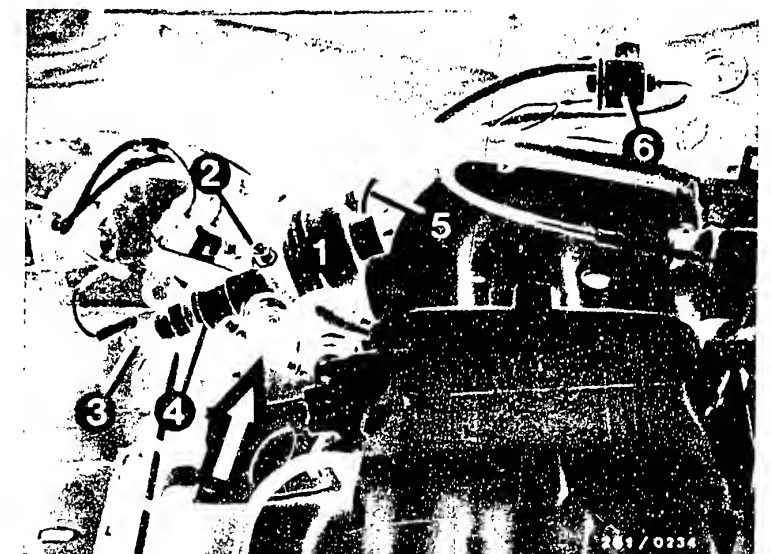
Idle-control valve (bottom picture -Item 1) with thermo-servo motor (3), relay, solenoid-operated valve (4), thermo-switch +45°C and air temperature sensor (0 °C). The air conditioner switch is also used for purposes of control. The idle-control valve acts as a variable bypass around the throttle valve and adjusts the air flow as a function of three overlapping influences:

1. Pneumatic adjusting of the opening cross-section with intake manifold pressure. The intake manifold pressure to the idle-control valve is blocked off by the solenoid-operated valve when the engine temperature is below +45°C and the air conditioner is on or if the air temperature is below 0 °C. Depending on outside temperature, a large cross-section is left open and the idle speed is raised to approx. 900 min⁻¹.
2. Adjusting of the opening cross-section with the thermo-servo motor. By means of electrical heating the opening cross-section is reduced in the warm-up phase.
3. Adjustable bypass for idle speed adjustment.

Continued on G14/G15



- 1=Relay for idle-speed control
- 2=Thermo-switch +45°C
- 3=Thermo-servo motor
- 4=Solenoid-operated valve
- 5=Thermo-switch, air 0 °C
- 6=to air-conditioner switch
- 7=Plug connection (6-pin; No. 4,5) in glove compartment



G12

Engine fails to start
BMW 525e



G13

Engine fails to start
BMW 525e



Starting motor operates, engine fails to start or starts only with great difficulty
(continued)

Testing the idle-speed control

1. Resistance measurements:

Thermo-servo motor: $15...25\ \Omega$ (at $+20^{\circ}\text{C}$)

Solenoid-op. valve: $18...45\ \Omega$

Thermo-switch $+45^{\circ}\text{C}$ (coolant):

below $+41^{\circ}\text{C}$ open ($\infty\ \Omega$)

above $+47^{\circ}\text{C}$ closed ($0\ \Omega$)

Thermo-switch 0°C (air):

below -8°C closed ($0\ \Omega$)

above $+4^{\circ}\text{C}$ open ($\infty\ \Omega$)

2. Voltage measurements with ignition on:

At relay between Term. 15 (+) and Term. D+:
battery voltage.

At solenoid-op. valve: no voltage.

At thermo-servo motor: no voltage.

3. Voltage measurements with engine running:

At thermo-servo motor: battery voltage.

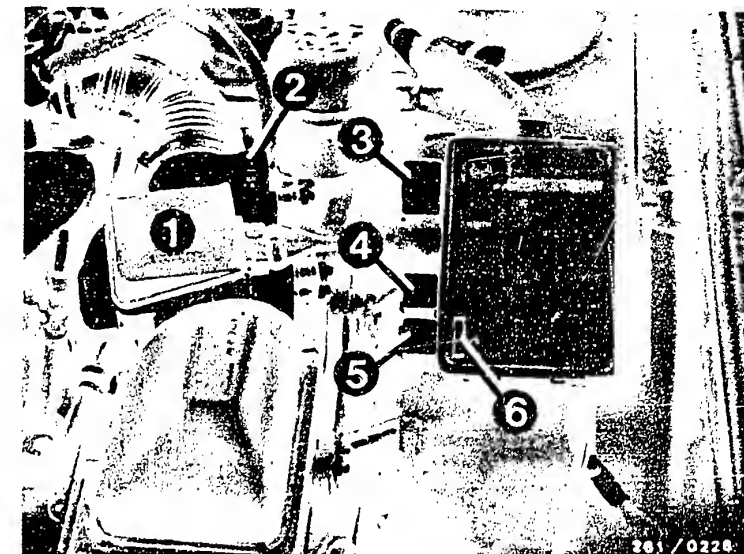
At solenoid-operated valve with air conditioner
off, air temperature above $+4^{\circ}\text{C}$ and engine
temperature above 47°C : battery voltage.

At solenoid-operated valve either with air
conditioner on or air temperature below -8°C
or engine temperature below $+41^{\circ}\text{C}$: no voltage.

yes

Continued on G18/G19

Continued on G16/G17



3=Relay for idle-speed control

1=Idle-control valve

2=Idle adjusting screw

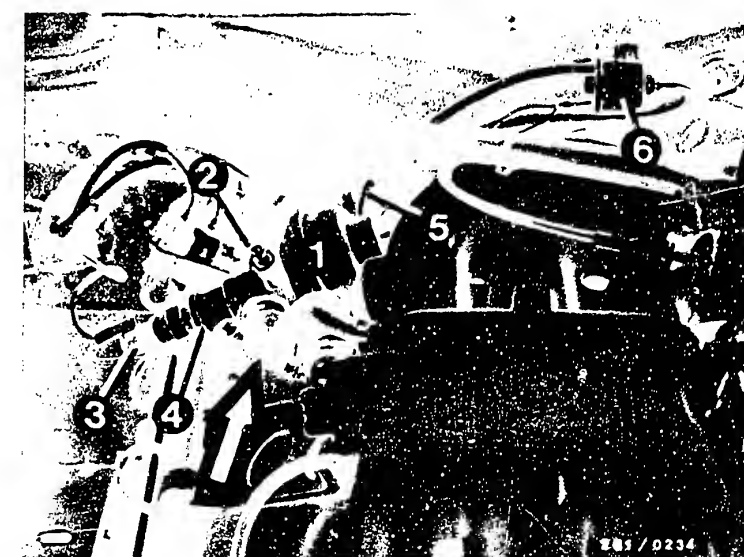
3=Thermo-servo motor

4=Lock nut

5=Hose to solenoid-operated valve

6=Solenoid-operated valve

Arrow=Hose to idle-control valve



G14

Engine fails to start
BMW 525e



G15

Engine fails to start
BMW 525e



Starting motor operates, engine fails to start or starts only with great difficulty
(continued)

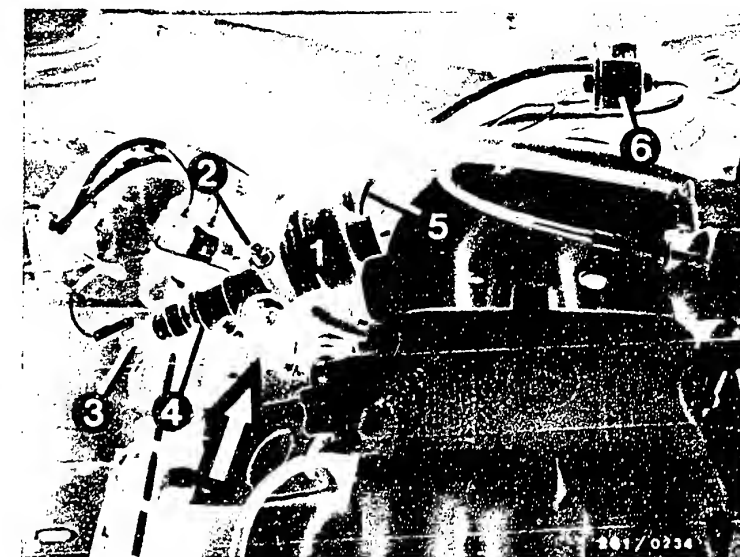
4. Pneumatic test:

Solenoid-operated valve under voltage:

Valve open, air passage between intake manifold and idle-control valve.

Solenoid-operated valve deenergized:

Valve closed, atmospheric pressure is applied to the idle-control valve



6=Solenoid-operated valve

yes

Continued on G18/G19

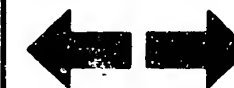
G 16

Engine fails to start
BMW 525e



G 17

Engine fails to start
BMW 525e



Starting motor operates, engine fails to start or starts only with great difficulty
(continued)

yes

Air-flow sensor mechanically
O.K.?

no

Testing: Open air-flow sensor flap by hand. It must be possible to open the air-flow sensor flap with uniform ease from its fully closed position to its fully open position. When released, the flap must close completely by itself. When the air-flow sensor flap is opened it must not catch at any point. Watch for any indications of abrasion or rubbing. Clean air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are any signs of abrasion or rubbing, replace the air-flow sensor.

yes

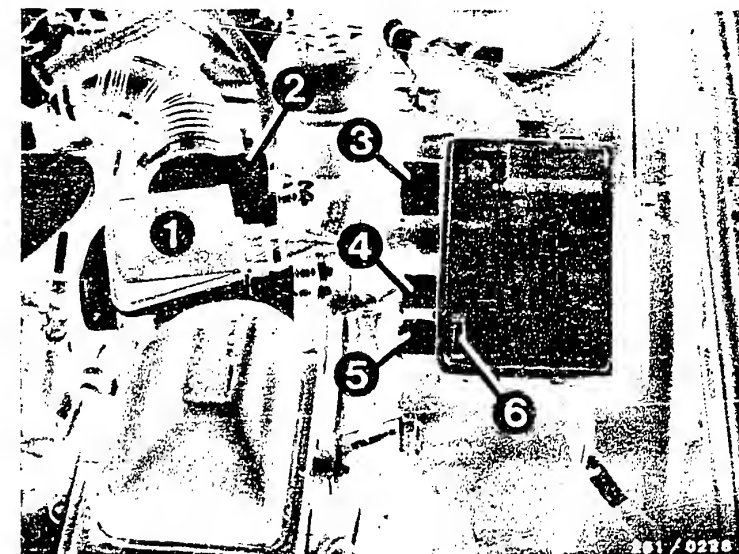
Are all hose lines and electric
leads securely attached?
Visual examination.
Is the air-intake system leak-
tight?

no

Check whether hoses of air-intake system and of fuel line system are securely attached, not kinked or damaged. If necessary, replace hoses. Eliminate leaks with new seals or by re-tightening the connecting screws.
Leak test: Seal off exhaust tail pipe. Take out air filter element and seal off air-flow sensor duct. Unscrew hose to idle-control valve and blow air (0.3 bar gauge pressure) into the intake manifold with a compressed-air gun. Seal off port on idle-control valve. Fully open throttle valve. Using soapy water, brush or spray all joints. Bubbling or foaming indicates a leak. Check electrical plug-in contacts for loose contacts.

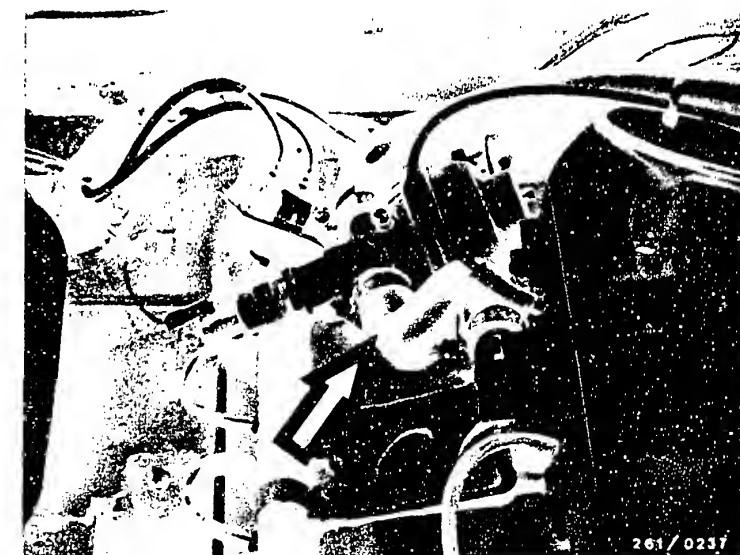
yes

Continued on G20/G21



1 = Air-flow sensor with NTC I
2 = Idle-mixture-adjusting screw

Arrow=Hose to idle-control valve



G 18

Engine fails to start
BMW 525e



G 19

Engine fails to start
BMW 525e



Starting motor operates, engine fails to start or starts only with great difficulty
(continued)

yes

Testing completed for customer complaint

"Starting motor operates, engine fails to start or starts only with great difficulty",

Customer complaint remedied?

no

Further possibilities

- Customer complaint incorrectly diagnosed (see Coordinates C3...C10). If the fault has not be detected by "direct trouble-shooting", see "detailed trouble-shooting" (Coordinates C3/C4).
- Engine not mechanically O.K. (Compression, valve setting, valve timing, worn camshaft).

G20

Engine fails to start

BMW 525e



G21

Engine fails to start

BMW 525e



ENGINE STARTS BUT THEN DIES

Trouble-shooting program according to customer complaints

How to use the following trouble-shooting program

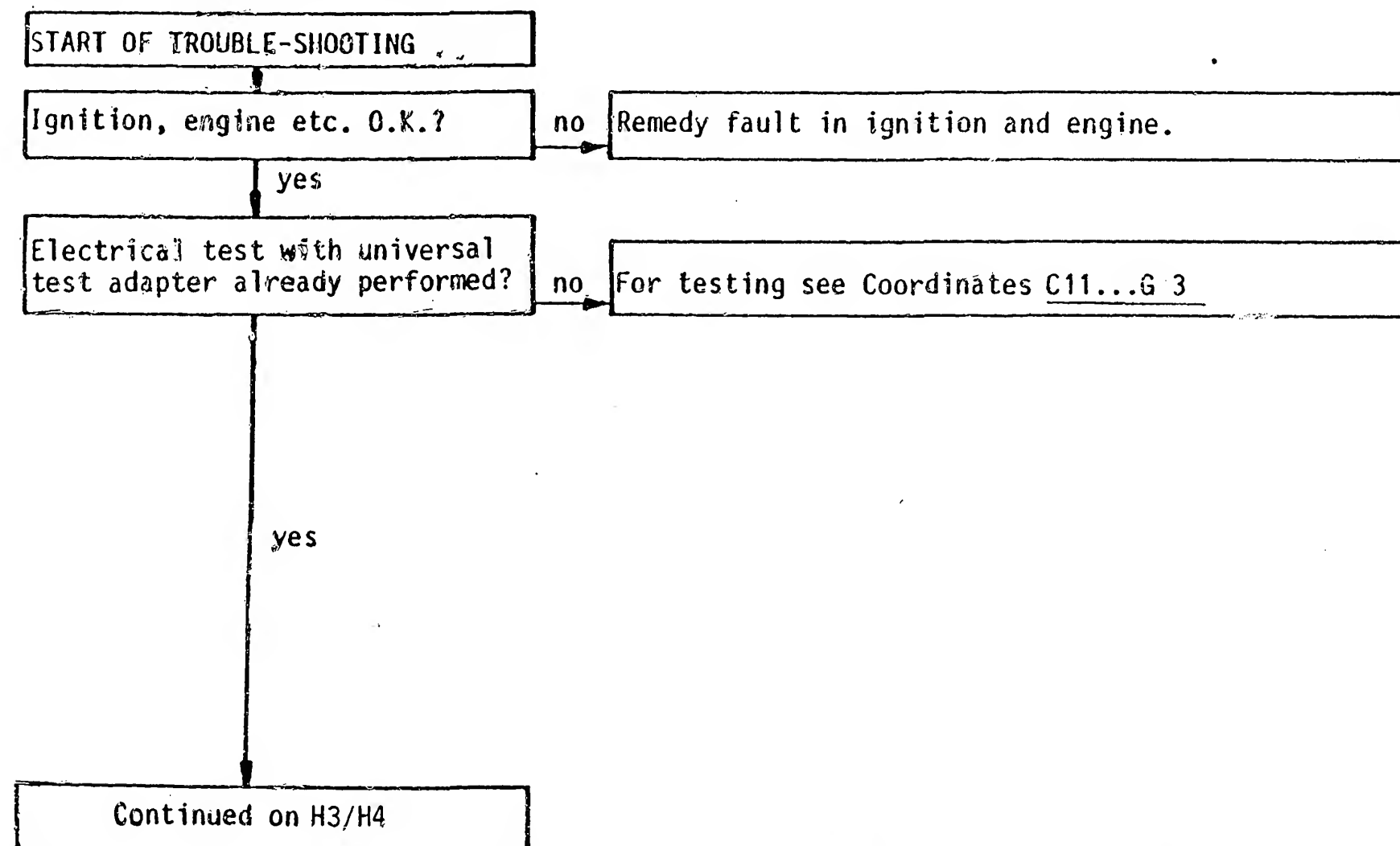
The program is divided into three rows of boxes:

- The left-hand row contains the questions on the tests.
- The middle row contains descriptions of the testing and adjustment operations on the components.
- The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.



H1

Engine starts but then dies
BMW 525e



H2

Engine starts but then dies
BMW 525e



Engine starts but then dies (continued)

yes

Are all hose lines and electric leads securely attached?
Visual examination.
Is the air-intake system leak-tight?

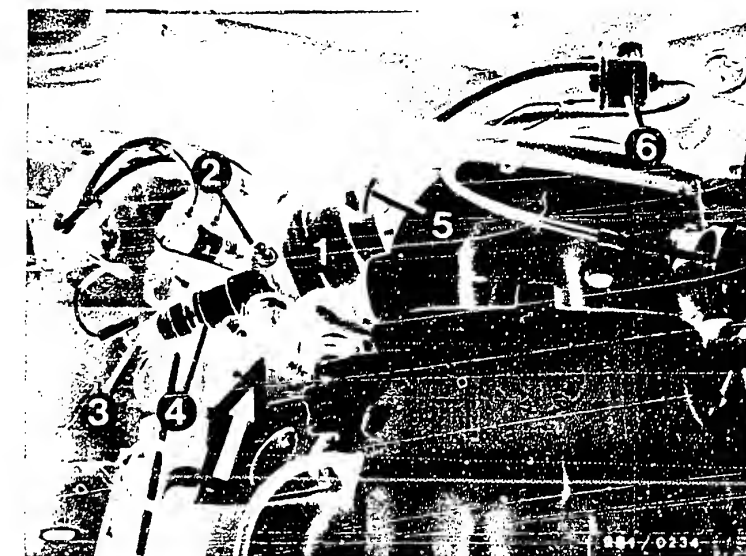
no

Check whether hoses of air-intake system and of fuel line system are securely attached, not kinked or damaged. If necessary, replace hoses. Eliminate leaks with new seals or by re-tightening the connecting screws.

Leak test: Seal off exhaust tail pipe. Take out air filter element and seal off air-flow sensor duct. Unscrew hose to idle-control valve and blow air (0.3 bar gauge pressure) into the intake manifold with a compressed-air gun. Seal off port on idle-control valve. Fully open throttle valve. Using soapy water, brush or spray all joints. Bubbling or foaming indicates a leak. Check electrical plug-in contacts for loose contacts.

yes

Continued on H5/H6



Arrow=Hose to idle-control valve

H3

Engine starts but then dies
BMW 525e



H4

Engine starts but then dies
BMW 525e



Engine starts but then dies (continued)

yes

Electropneumatic idle-speed control (not from Bosch) O.K.?

no

yes

Continued on H11/H12

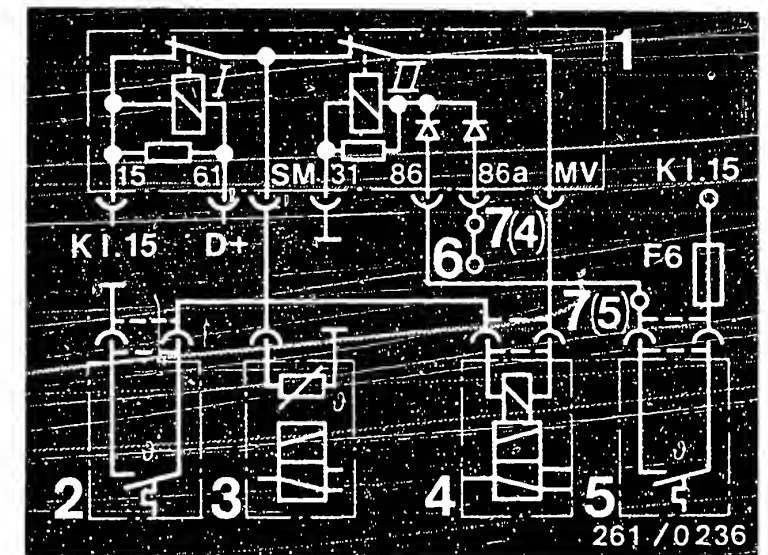
Operating principle of electropneumatic idle-speed control

The idle-speed control consists of the following components:

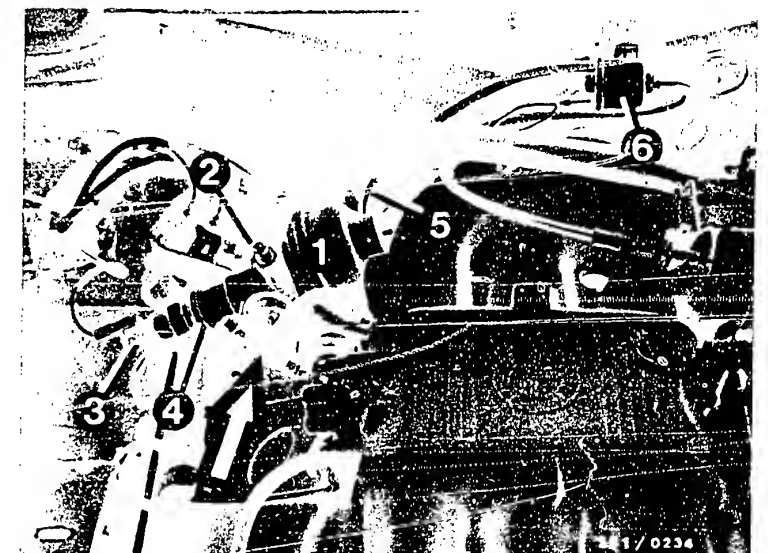
Idle-control valve (bottom picture -Item 1) with thermo-servo motor (3), relay, solenoid-operated valve (4), thermo-switch +45°C and air temperature sensor (0 °C). The air conditioner switch is also used for purposes of control. The idle-control valve acts as a variable bypass around the throttle valve and adjusts the air flow as a function of three overlapping influences:

1. Pneumatic adjusting of the opening cross-section with intake manifold pressure. The intake manifold pressure to the idle-control valve is blocked off by the solenoid-operated valve when the engine temperature is below +45°C and the air conditioner is on or if the air temperature is below 0 °C. Depending on outside temperature, a large cross-section is left open and the idle speed is raised to approx. 900 min⁻¹.
2. Adjusting of the opening cross-section with the thermo-servo motor. By means of electrical heating the opening cross-section is reduced in the warm-up phase.
3. Adjustable bypass for idle speed adjustment.

Continued on H7/H8



- 1=Relay for idle-speed control
- 2=Thermo-switch +45°C
- 3=Thermo-servo motor
- 4=Solenoid-operated valve
- 5=Thermo-switch, air 0 °C
- 6=to air-conditioner switch
- 7=Plug connection (6-pin; No. 4,5) in glove compartment



H5

Engine starts but then dies
BMW 525e



H6

Engine starts but then dies
BMW 525e



Engine starts but then dies (continued)

Testing the idle-speed control

1. Resistance measurements:

Thermo-servo motor: $15...25\ \Omega$ (at $+20^{\circ}\text{C}$)

Solenoid-op. valve: $18...45\ \Omega$

Thermo-switch $+45^{\circ}\text{C}$ (coolant):

below $+41^{\circ}\text{C}$ open ($\infty\ \Omega$)

above $+47^{\circ}\text{C}$ closed ($0\ \Omega$)

Thermo-switch 0°C (air):

below -8°C closed ($0\ \Omega$)

above $+4^{\circ}\text{C}$ open ($\infty\ \Omega$)

2. Voltage measurements with ignition on:

At relay between Term. 15 (+) and Term. D+:
battery voltage.

At solenoid-op. valve: no voltage.

At thermo-servo motor: no voltage.

3. Voltage measurements with engine running:

At thermo-servo motor: battery voltage.

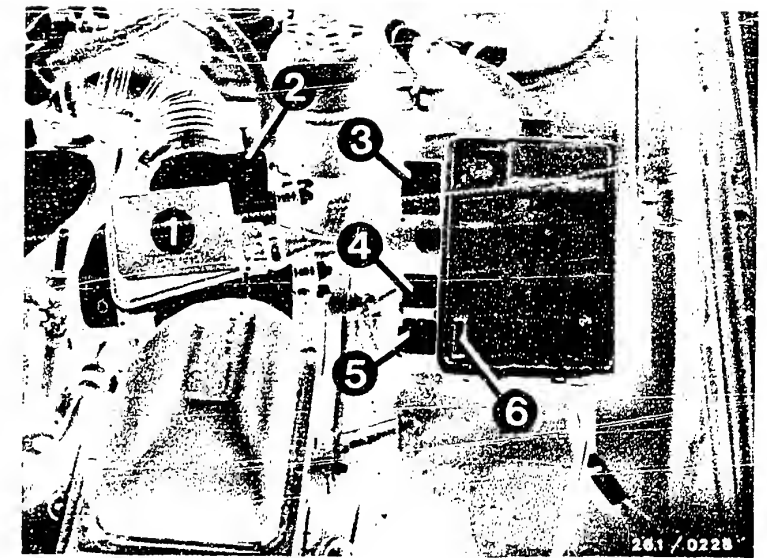
At solenoid-operated valve with air conditioner
off, air temperature above $+4^{\circ}\text{C}$ and engine
temperature above 47°C : battery voltage.

At solenoid-operated valve either with air
conditioner on or air temperature below -8°C
or engine temperature below $+41^{\circ}\text{C}$: no voltage.

yes

Continued on H11/H12

Continued on H9/H10



3=Relay for idle-speed control

1=Idle-control valve

2=Idle adjusting screw

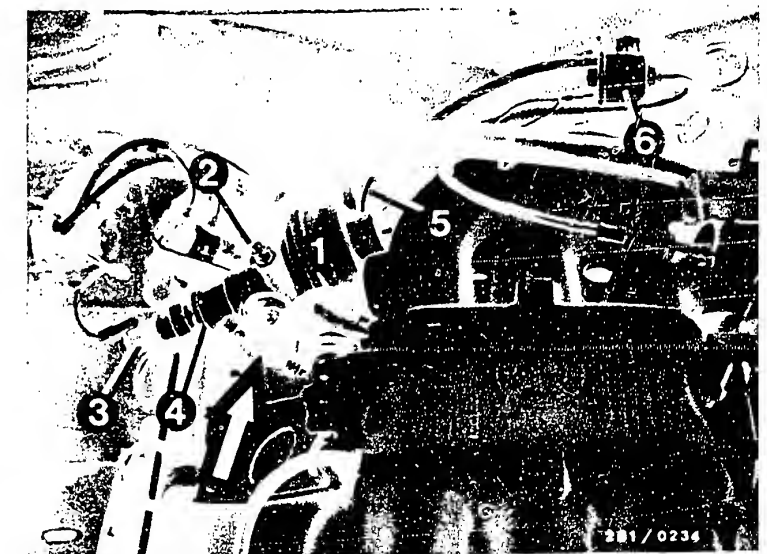
3=Thermo-servo motor

4=Lock nut

5=Hose to solenoid-operated valve

6=Solenoid-operated valve

Arrow=Hose to idle-control valve



H7

Engine starts but then dies

BMW 525e



H8

Engine starts but then dies

BMW 525e



Engine starts but then dies (continued)

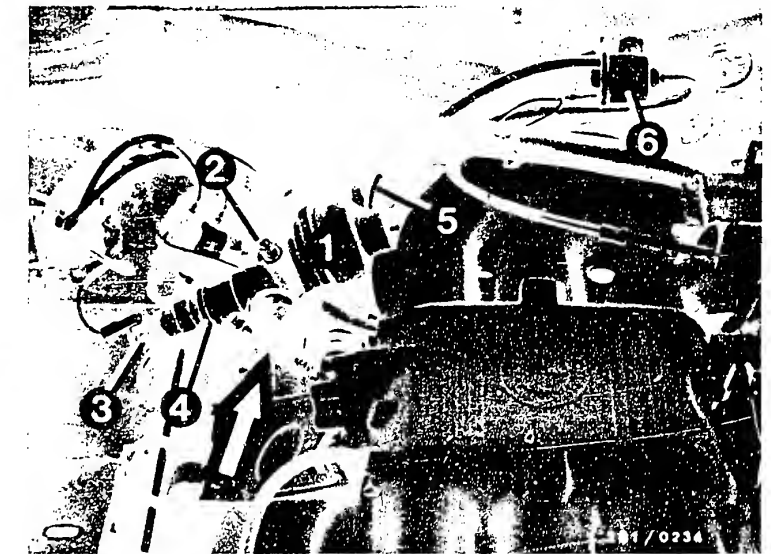
4. Pneumatic test:

Solenoid-operated valve under voltage:

Valve open, air passage between intake manifold and idle-control valve.

Solenoid-operated valve deenergized:

Valve closed, atmospheric pressure is applied to the idle-control valve



6=Solenoid-operated valve

yes

Continued on H11/H12

H9

Engine starts but then dies
BMW 525e



H10

Engine starts but then dies
BMW 525e



Engine starts but then dies (continued)

yes

Air-flow sensor O.K.?

no

Testing: Open air-flow sensor flap by hand. It must be possible to open the air-flow sensor flap with uniform ease from its fully closed position to its fully open position. When released, the flap must close completely by itself. When the air-flow sensor flap is opened it must not catch at any point. Watch for any indications of abrasion or rubbing. Clean air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are any signs of abrasion or rubbing, replace the air-flow sensor.

yes

Testing completed for customer complaint

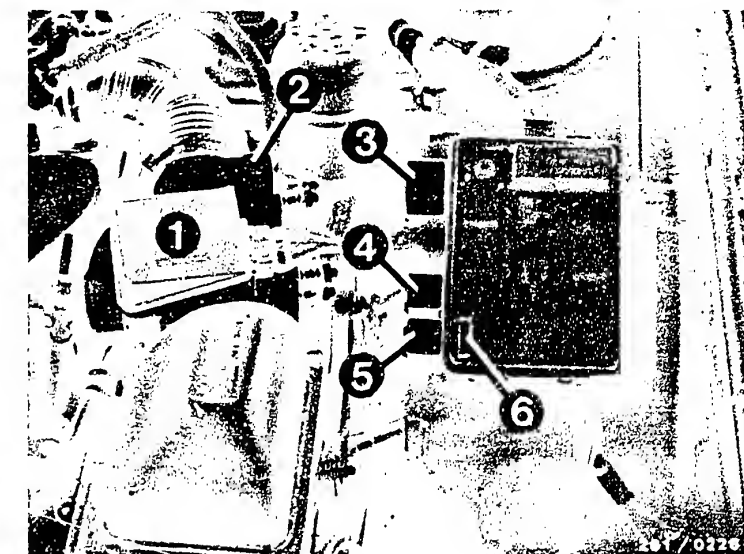
"Engine starts but then dies".

Customer complaint remedied?

no

Further possibilities:

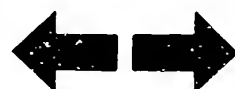
- Customer complaint incorrectly diagnosed (see Coordinates C3...C10). If the fault has not been detected by "direct trouble-shooting", see "detailed trouble-shooting" (Coordinates C3/C4).
- Engine not mechanically O.K. (Compression, valve setting, valve timing, worn camshaft).



1 = Air-flow sensor with NTC 1
2 = Idle-mixture-adjusting screw

H11

Engine starts but then dies
BMW 525e



H12

Engine starts but then dies
BMW 525e



ROUGH IDLING/INCORRECT IDLE SPEED

Trouble-shooting program according to customer complaints

How to use the following trouble-shooting program

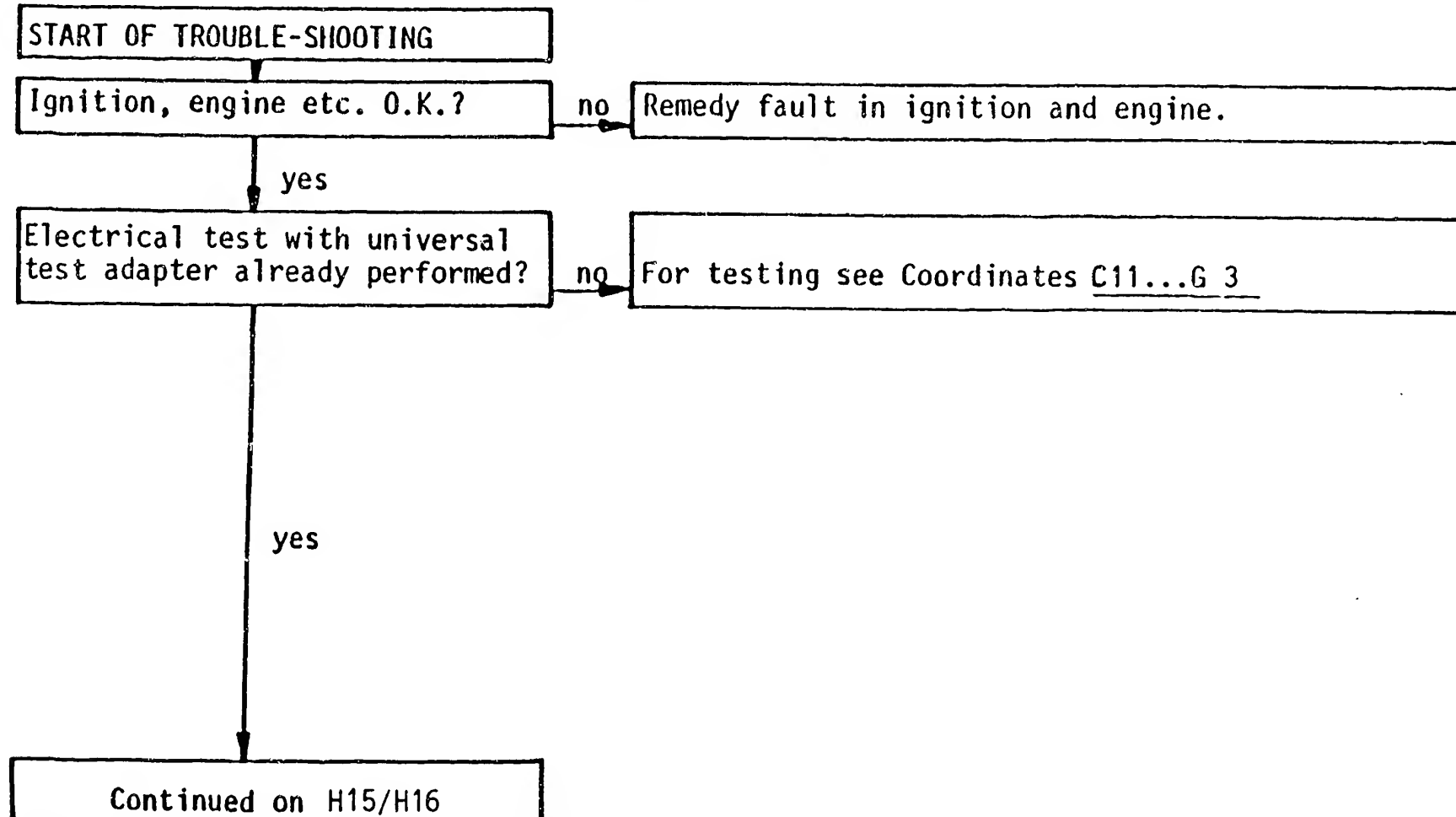
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- The middle row contains descriptions of the testing and adjustment operations on the components.
- The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.



H13

Uneven engine idle
BMW 525e



H14

Uneven engine idle
BMW 525e



Rough idling/incorrect idle speed (continued)

yes

Check secondary pattern of all cylinders.
Secondary pattern O.K.?

no

Check ignition coil and high-voltage section:
Distributor cap oil-fouled inside and outside?
(Remove distributor rotor and check camshaft seal).

Note:

The distributor cap is fastened with 3 screws. To remove the distributor cap, it is necessary to remove the radiator cover.

When plugging on the H.T. ignition cables, pay attention to the cylinder numbers. Do not forget the cap and screening cover.

Check ignition coil primary for continuity (approx. $0\ \Omega$). Secondary resistance: $5...7.2\ k\Omega$. Test interference-suppression resistors, H.T. ignition cables and spark plugs.

Interference-suppression resistor in

Distributor rotor:	1 $k\Omega$
Distributor domes:	1 $k\Omega$ each
Spark-plug connector:	5 $k\Omega$ each
Spark plugs:	0 $k\Omega$
Ignition coil:	1 $k\Omega$

yes

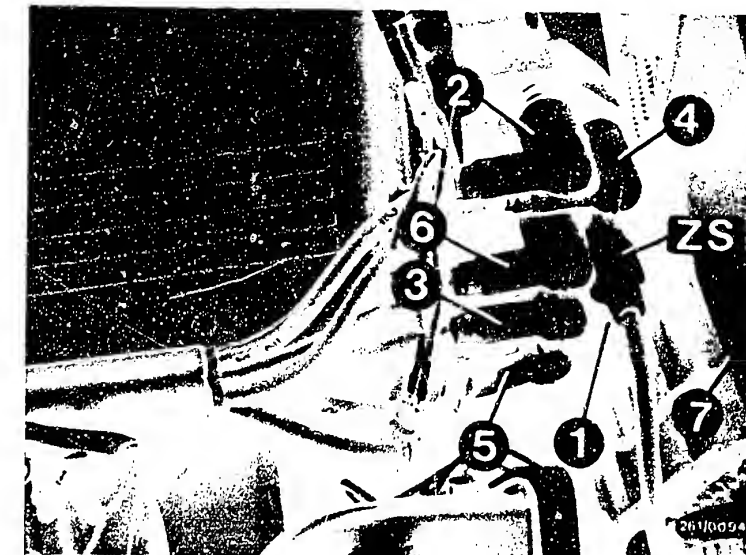
Air-flow sensor O.K.?

no

Testing: Open air-flow sensor flap by hand. It must be possible to open the air-flow sensor flap with uniform ease from its fully closed position to its fully open position. When released, the flap must close completely by itself. When the air-flow sensor flap is opened it must not catch at any point. Watch for any indications of abrasion or rubbing. Clean air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are any signs of abrasion or rubbing, replace the air-flow sensor.

yes

Continued on H17/H18



High-voltage distributor

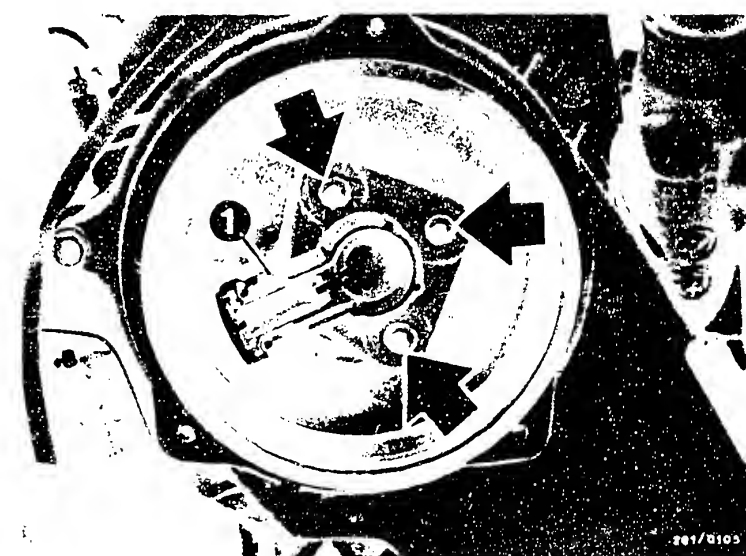
1 to 6 = cylinder numbers

ZS = High-tension lead to ignition coil

7 = Radiator cover

1 = Distributor rotor

Arrows = Fastening screws



H15

Uneven engine idle

BMW 525e



H16

Uneven engine idle

BMW 525e



Rough idling/incorrect idle speed (continued)

Throttle valve closed?

no

Testing:

Check whether the throttle valve can be closed still further and whether the engine speed thereby drops.

Visual examination:

Loosen hose clamp and remove hose from throttle-valve assembly. Throttle valve set to hair's breadth gap? If necessary, make adjustment. After correction, re-adjust throttle cable.

Adjusting the throttle-valve switch

Slightly loosen fastening screws. Connect ohm-meter to throttle-valve switch Term. 2 and ground. Turn actuating lever to "wide-open throttle" and slowly return to idle stop. Turn throttle-valve switch until the inner stop can be felt (Reading 0 Ω).

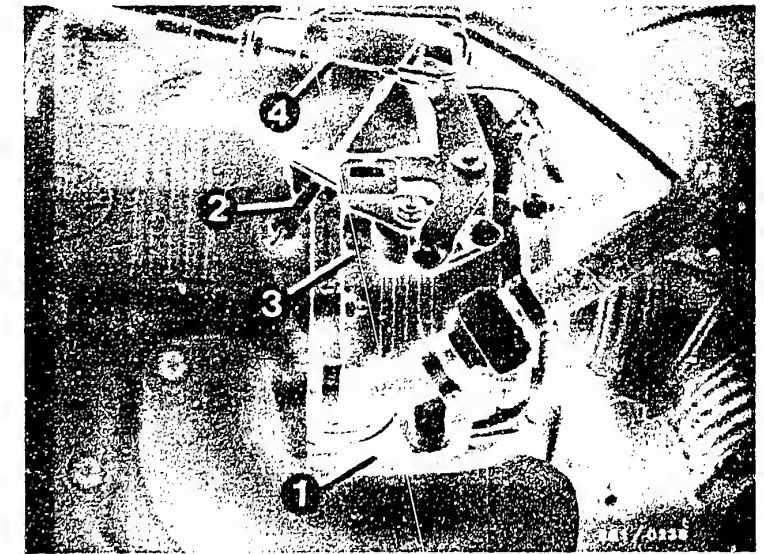
Tighten screws.

Checking the adjustment:

Pull slightly on throttle cable. The idle contact must click (reading $\infty \Omega$).

yes

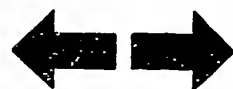
Continued on H19/H20



- 1=Throttle-valve switch
- 2=Throttle cable
- 3=Idle stop screw
- 4=Cable to automatic transmission

H17

Uneven engine idle
BMW 525e



H18

Uneven engine idle
BMW 525e



Rough idling/incorrect idle speed (continued)

yes

Are all hose lines and electric leads securely attached?
Visual examination.
Is the air-intake system leak-tight?

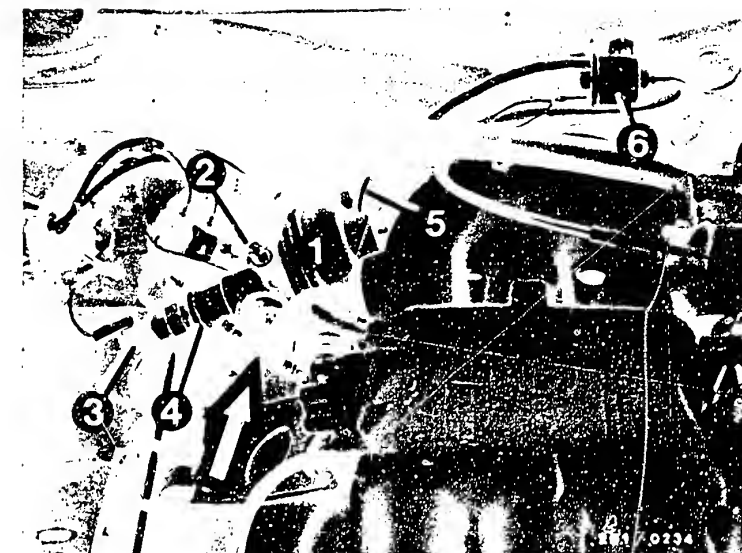
no

Check whether hoses of air-intake system and of fuel line system are securely attached, not kinked or damaged. If necessary, replace hoses. Eliminate leaks with new seals or by re-tightening the connecting screws.

Leak test: Seal off exhaust tail pipe. Take out air filter element and seal off air-flow sensor duct. Unscrew hose to idle-control valve and blow air (0.3 bar gauge pressure) into the intake manifold with a compressed-air gun. Seal off port on idle-control valve. Fully open throttle valve. Using soapy water, brush or spray all joints. Bubbling or foaming indicates a leak. Check electrical plug-in contacts for loose contacts.

yes

Continued on H21/H22



Arrow=Hose to idle-control valve

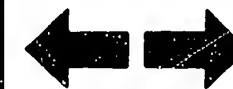
H19

Uneven engine idle
BMW 525e



H20

Uneven engine idle
BMW 525e



Rough idling/incorrect idle speed (continued)

yes

Electropneumatic idle-speed control (not from Bosch) O.K.?

no

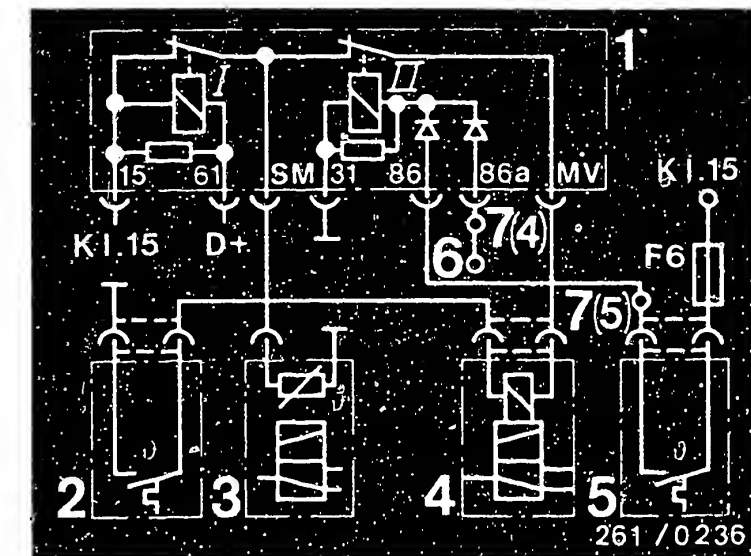
yes

Operating principle of electropneumatic idle-speed control!

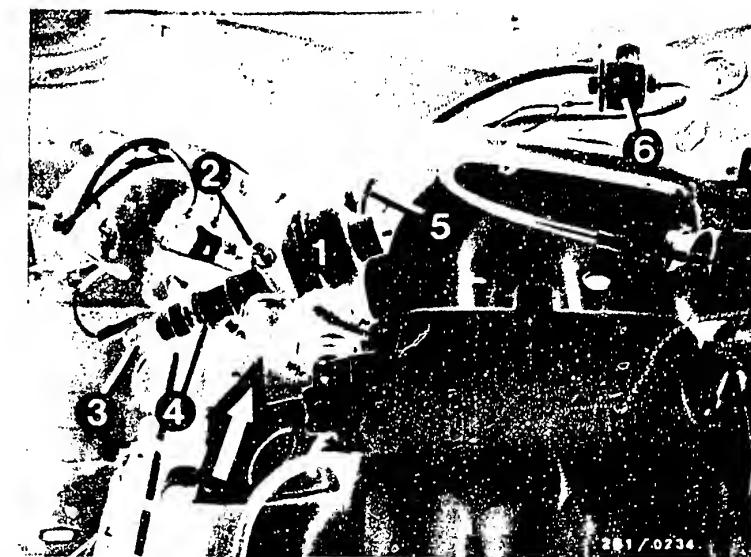
The idle-speed control consists of the following components:

Idle-control valve (bottom picture -Item 1) with thermo-servo motor (3), relay, solenoid-operated valve (4), thermo-switch +45°C and air temperature sensor (0 °C). The air conditioner switch is also used for purposes of control. The idle-control valve acts as a variable bypass around the throttle valve and adjusts the air flow as a function of three overlapping influences:

1. Pneumatic adjusting of the opening cross-section with intake manifold pressure. The intake manifold pressure to the idle-control valve is blocked off by the solenoid-operated valve when the engine temperature is below +45°C and the air conditioner is on or if the air temperature is below 0 °C. Depending on outside temperature, a large cross-section is left open and the idle speed is raised to approx. 900 min⁻¹.
2. Adjusting of the opening cross-section with the thermo-servo motor. By means of electrical heating the opening cross-section is reduced in the warm-up phase.
3. Adjustable bypass for idle speed adjustment.



- 1=Relay for idle-speed control
- 2=Thermo-switch +45°C
- 3=Thermo-servo motor
- 4=Solenoid-operated valve
- 5=Thermo-switch, air 0 °C
- 6=to air-conditioner switch
- 7=Plug connection (6-pin;) in glove compartment



Continued on J3/J4

Continued on H23/H24

H21

Uneven engine idle
BMW 525e



H22

Uneven engine idle
BMW 525e



Rough idling/incorrect idle speed (continued)

Testing the idle-speed control

1. Resistance measurements:

Thermo-servo motor: $15...25\ \Omega$ (at $+20^{\circ}\text{C}$)

Solenoid-op. valve: $18...45\ \Omega$

Thermo-switch $+45^{\circ}\text{C}$ (coolant):

below $+41^{\circ}\text{C}$ open ($\infty\ \Omega$)

above $+47^{\circ}\text{C}$ closed ($0\ \Omega$)

Thermo-switch 0°C (air):

below -8°C closed ($0\ \Omega$)

above $+4^{\circ}\text{C}$ open ($\infty\ \Omega$)

2. Voltage measurements with ignition on:

At relay between Term. 15 (+) and Term. D+:
battery voltage.

At solenoid-op. valve: no voltage.

At thermo-servo motor: no voltage.

3. Voltage measurements with engine running:

At thermo-servo motor: battery voltage.

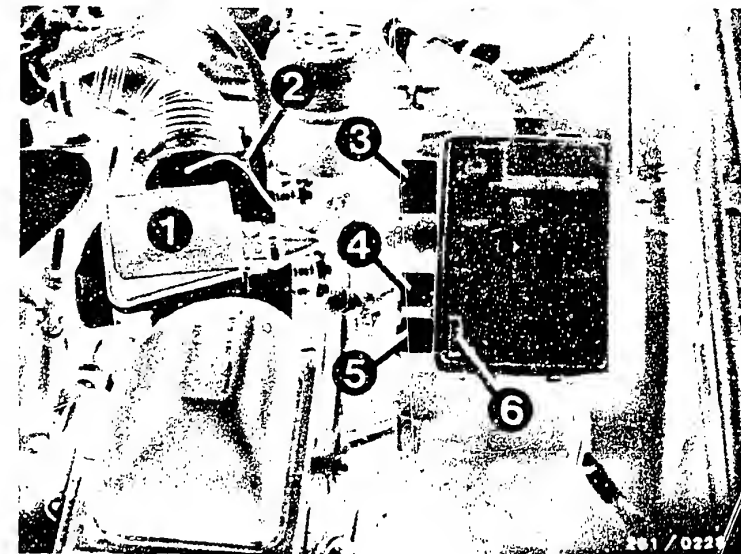
At solenoid-operated valve with air conditioner
off, air temperature above $+4^{\circ}\text{C}$ and engine
temperature above 47°C : battery voltage.

At solenoid-operated valve either with air
conditioner on or air temperature below -8°C
or engine temperature below $+41^{\circ}\text{C}$: no voltage.

yes

Continued on J3/J4

Continued on J1/J2



3=Relay for idle-speed control

1=Idle-control valve

2=Idle adjusting screw

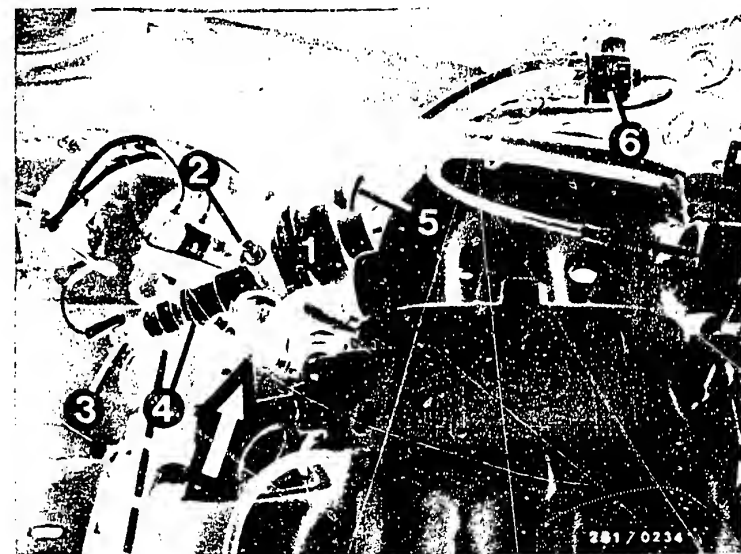
3=Thermo-servo motor

4=Lock nut

5=Hose to solenoid-operated valve

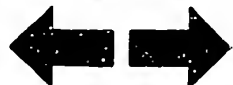
6=Solenoid-operated valve

Arrow=Hose to idle-control valve



H23

Uneven engine idle
BMW 525e



H24

Uneven engine idle
BMW 525e



Rough idling/incorrect idle speed (continued)

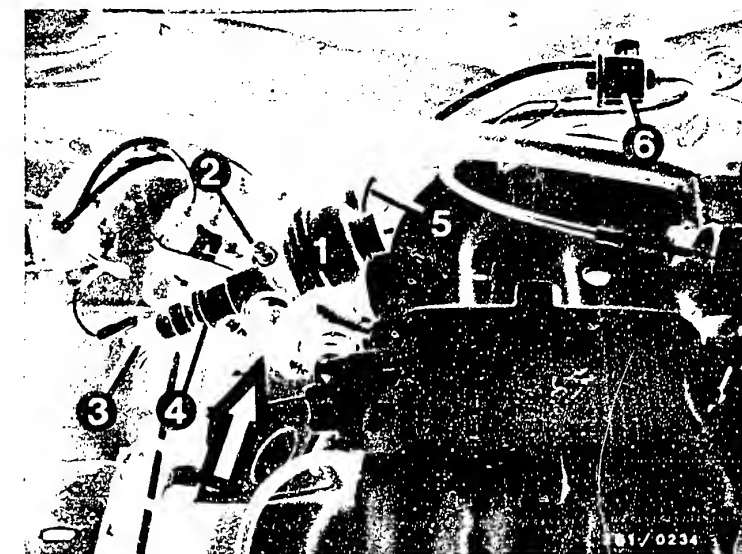
4. Pneumatic test:

Solenoid-operated valve under voltage:

Valve open, air passage between intake manifold and idle-control valve.

Solenoid-operated valve deenergized:

Valve closed, atmospheric pressure is applied to the idle-control valve



6=Solenoid-operated valve

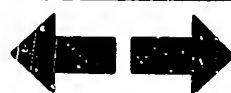
yes

Continued on J3/J4

J1

Uneven engine idle

BMW 525e



J2

Uneven engine idle

BMW 525e



Rough idling/incorrect idle speed (continued)

yes

Solenoid-operated injection valves:

1. Mechanically O.K.?
2. O-rings O.K. (Unmetered air)?

no

1. With the engine running, remove injection-valve connectors individually, one after the other, from the injection valves and plug on again. Engine speed must drop if injection valve is O.K. If not, replace injection valve.

2. Defective O-rings at the protection sleeve lead to unmetered air and thus to a leaning of the mixture.

Defective O-rings at the fuel-distribution pipe connection lead to leaks.

Replace defective O-rings.

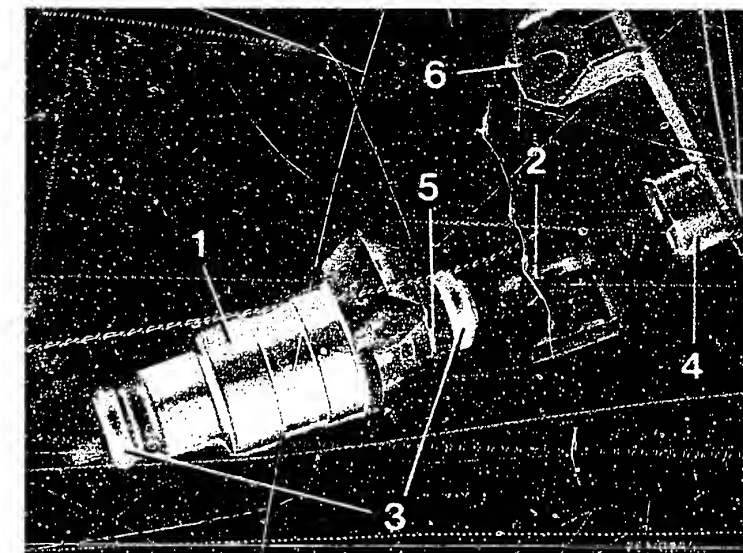
Removing the injection valves

Loosen fastening screws on fuel-distribution pipe. Pull fuel-distribution pipe upward until the injection valves are out of the bore in the intake manifold. Do not damage the nozzle needle. Check nozzle needle and surrounding area for leaks and deposits. Remove electrical connector. Carefully withdraw holding clamps out of groove and pull injection valve out of fuel-distribution pipe connection.

yes

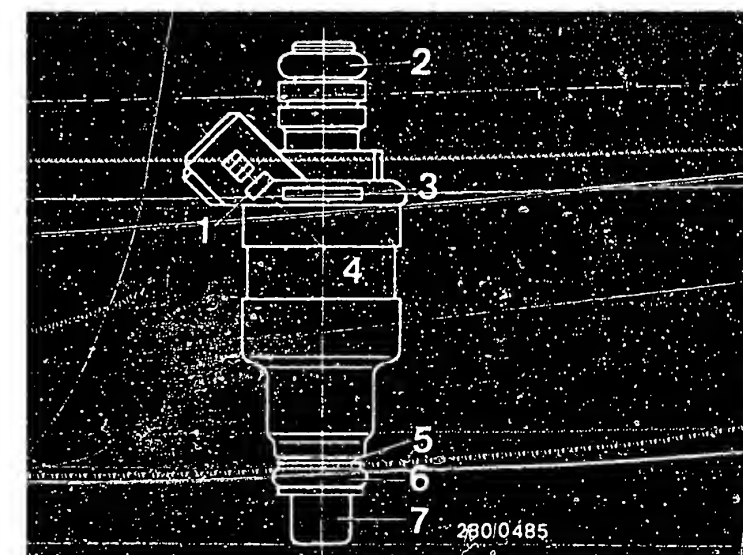
Continued on J7/J8

Continued on J5/J6



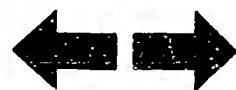
- 1=Injection valve
- 2=Holding clamp
- 3=Rubber seal (O-ring)
- 4=Fuel-distribution pipe connection
- 5=Groove
- 6=Fastening strap

- 2=upper O-ring
- 6=lower O-ring
- 7=Protection sleeve



J3

Uneven engine idle
BMW 525e



J4

Uneven engine idle
BMW 525e



Rough idling/incorrect idle speed (continued)

Caution

Catch any escaping fuel. Do not allow to drip onto hot parts of the engine. Fire hazard.

Caution

Protection sleeve must not be levered off.

Installation of the injection valves

Damaged or swollen O-rings must be replaced.

Use parts set 1 287 010 704.

Cut through lower O-ring (intake port).

Caution: do not damage protection sleeve.

Fit new O-ring over protection sleeve and its bead. Do not damage any parts.

Before installing, check both rubber seals for proper seating.

Mount injection valves on fuel distribution pipe.

Press all 4 injection valves simultaneously into their seats with the fuel-distribution pipe.

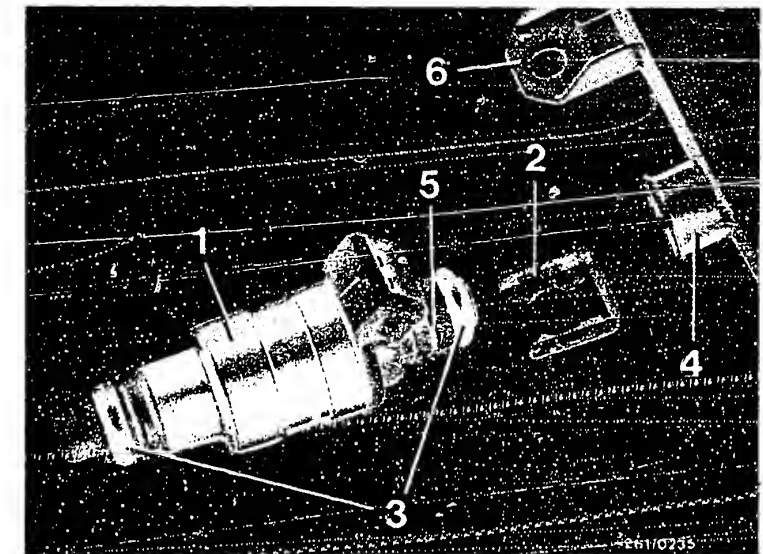
Secure the fuel-distribution pipe. Check all air and fuel hoses for security.

Make the electrical connections.

Start the engine and check whether any unmetered air is being drawn in.

yes

Continued on J7/J8



1=Injection valve

2=Holding clamp

3=Rubber seal (O-ring)

4=Fuel-distribution pipe connection

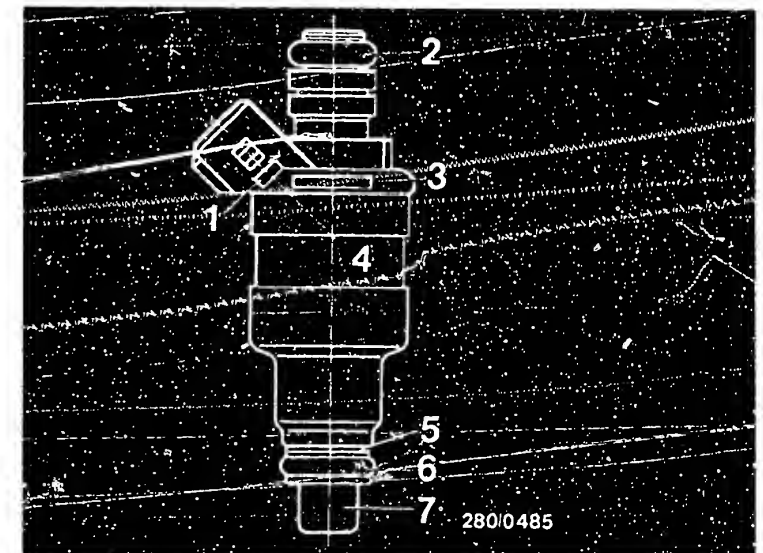
5=Groove

6=Fastening strap

2=upper O-ring

6=lower O-ring

7=Protection sleeve



J5

Uneven engine idle

BMW 525e



J6

Uneven engine idle

BMW 525e



Rough idling/incorrect idle speed (continued)

yes

With engine at normal operating temperature, set idle speed with idle screw to

650...750 min⁻¹

With engine at normal operating temperature, set CO adjusting screw to

0,5...1,5 % by vol. CO

yes

Testing completed for customer complaint

"Rough idling/incorrect idle speed."

Customer complaint remedied?

no

- Adjust idle speed at idle-adjusting screw in idle-control valve.
- Adjust exhaust gas with idle-mixture-adjusting screw (hexagon-socket-head AF 5) in air-flow sensor. To do this, remove plug.

If CO cannot be adjusted:

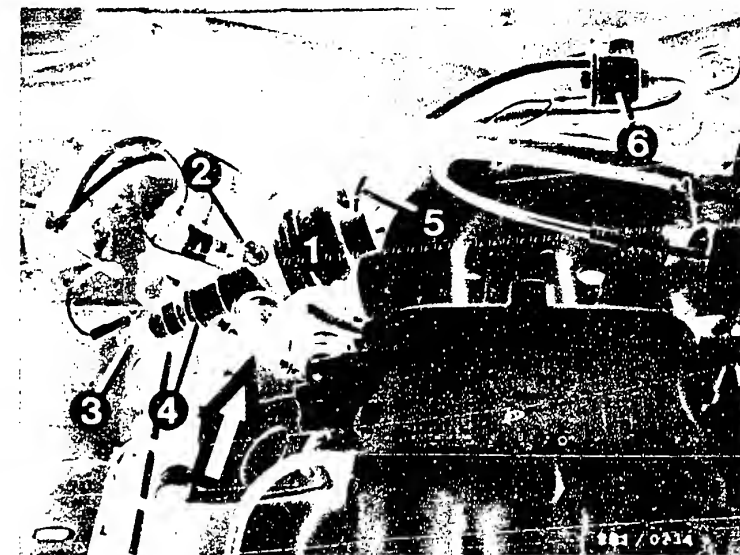
- CO concentration too low: Repeat leak test on air-intake system.
- CO concentration too high: Replace air-flow sensor.

Note: Use new plug (red) in air-flow sensor after CO adjustment.

no

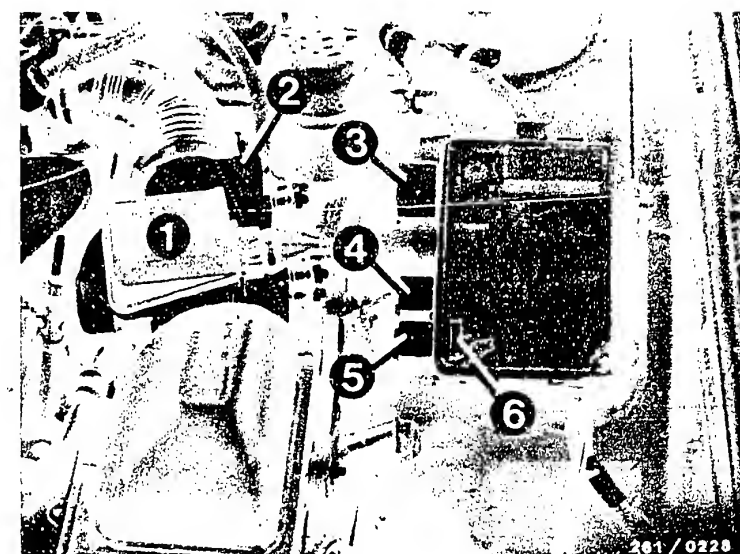
Further possibilities:

- Customer complaint incorrectly diagnosed (see Coordinates C3...C10).
If the fault has not been detected by "direct trouble-shooting", see "detailed trouble shooting" (Coordinates C3/C4).
- Engine not mechanically O.K. (compression, valve setting, valve timing, worn camshaft).



1=Idle-control valve
2=Idle-adjusting screw

1=Air-flow sensor with NTC I
2=Idle-mixture-adjusting screw



J7

Uneven engine idle
BMW 525e



J8

Uneven engine idle
BMW 525e



POOR THROTTLE TAKE-UP

Trouble-shooting program according to customer complaints

How to use the following trouble-shooting program

The program is divided into three rows of boxes:

- The left-hand row contains the questions on the tests.
- The middle row contains descriptions of the testing and adjustment operations on the components.
- The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.

START OF TROUBLE-SHOOTING

Ignition, engine etc. O.K.?

no

Remedy fault in ignition and engine.

yes

Electrical test with universal
test adapter already performed?

no

For testing see Coordinates .C11...G 3

yes

Continued on J11/J12

J9

Poor throttle take-up

BMW 525e



J10

Poor throttle take-up

BMW 525e



Poor throttle take-up (continued)

yes

Check secondary pattern of all cylinders.
Secondary pattern O.K.?

no

Check ignition coil and high-voltage section:
Distributor cap oil-fouled inside and outside?
(Remove distributor rotor and check camshaft seal).

Note:

The distributor cap is fastened with 3 screws. To remove the distributor cap, it is necessary to remove the radiator cover.
When plugging on the H.T. ignition cables, pay attention to the cylinder numbers. Do not forget the cap and screening cover.

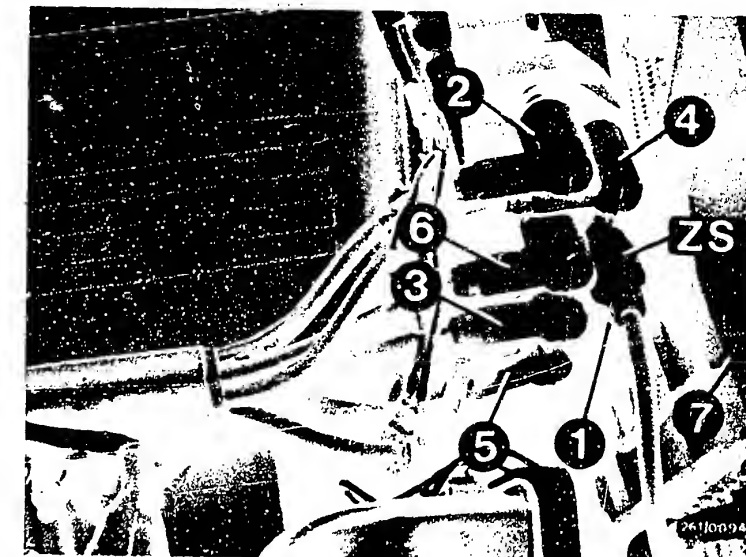
Check ignition coil primary for continuity (approx. 0 Ω). Secondary resistance: 5...7.2 k Ω . Test interference-suppression resistors, H.T. ignition cables and spark plugs.

Interference-suppression resistor in

Distributor rotor:	1 k Ω
Distributor domes:	1 k Ω each
Spark-plug connector:	5 k Ω each
Spark plugs:	0 k Ω
Ignition coil:	1 k Ω

yes

Continued on J13/J14



High-voltage distributor

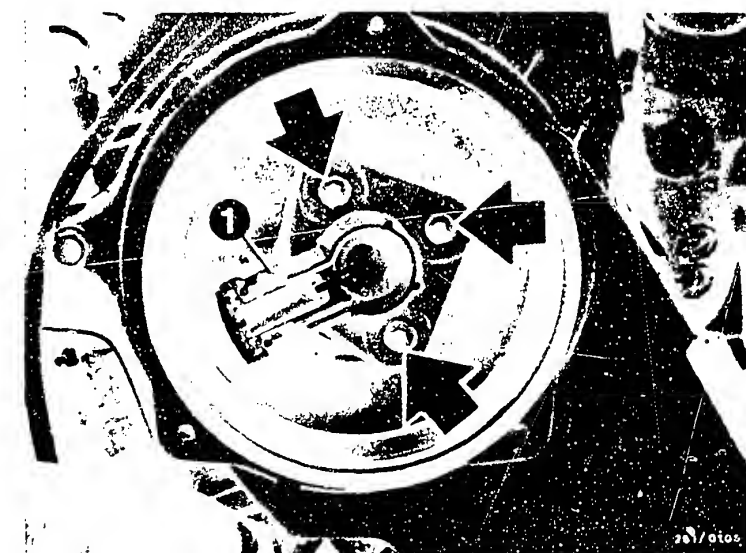
1 to 6 = cylinder numbers

ZS = High-tension lead to ignition coil

7 = Radiator cover

1 = Distributor rotor

Arrows = Fastening screws



J11

Poor throttle take-up

BMW 525e



J12

Poor throttle take-up

BMW 525e



Poor throttle take-up (continued)

yes

Throttle valve closed?

no

Testing:

Check whether the throttle valve can be closed still further and whether the engine speed thereby drops.

Visual examination:

Loosen hose clamp and remove hose from throttle-valve assembly. Throttle valve set to hair's breadth gap? If necessary, make adjustment. After correction, re-adjust throttle cable.

Adjusting the throttle-valve switch

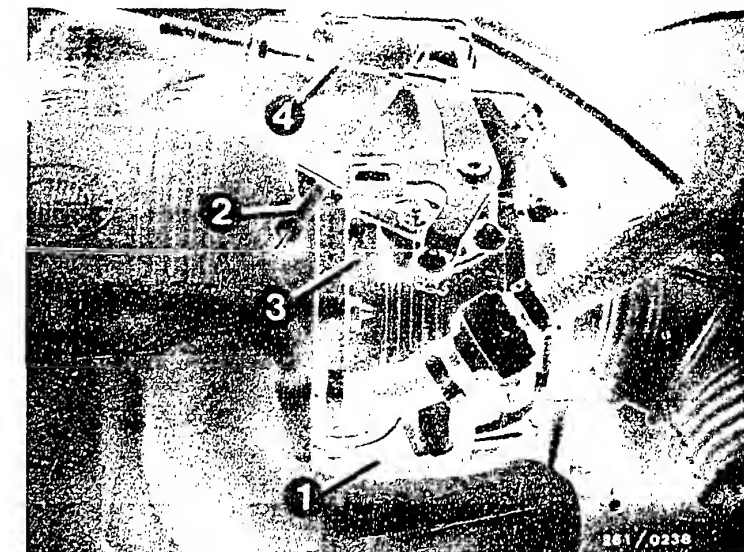
Slightly loosen fastening screws. Connect ohm-meter to throttle-valve switch Term. 2 and ground. Turn actuating lever to "wide-open throttle" and slowly return to idle stop. Turn throttle-valve switch until the inner stop can be felt (Reading 0 Ω).

Tighten screws.

Checking the adjustment:

Pull slightly on throttle cable. The idle contact must click (reading $\infty \Omega$).

yes



1=Throttle-valve switch

2=Throttle cable

3=Idle stop screw

4=Cable to automatic transmission

Continued on J15/J16

J13

Poor throttle take-up
BMW 525e



J14

Poor throttle take-up
BMW 525e



Poor throttle take-up (continued)

yes

Air-flow sensor mechanically O.K.?

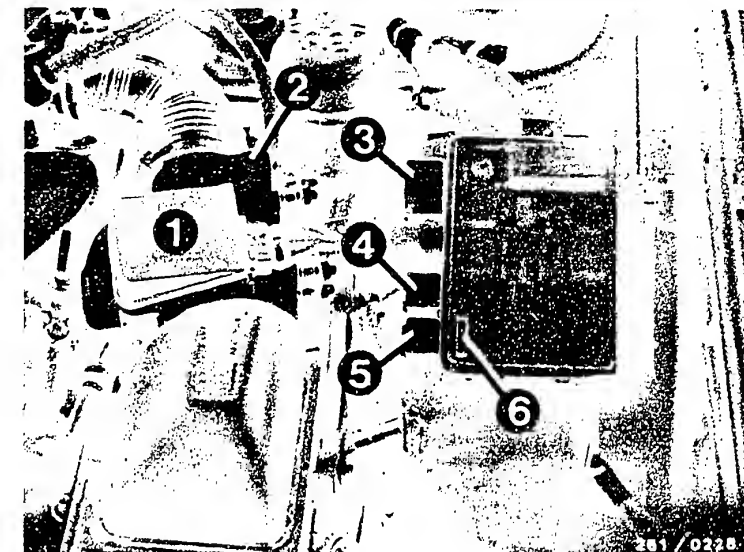
no

yes

Testing: Open air-flow sensor flap by hand. It must be possible to open the air-flow sensor flap with uniform ease from its fully closed position to its fully open position. When released, the flap must close completely by itself. When the air-flow sensor flap is opened it must not catch at any point. Watch for any indications of abrasion or rubbing. Clean air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are any signs of abrasion or rubbing, replace the air-flow sensor.

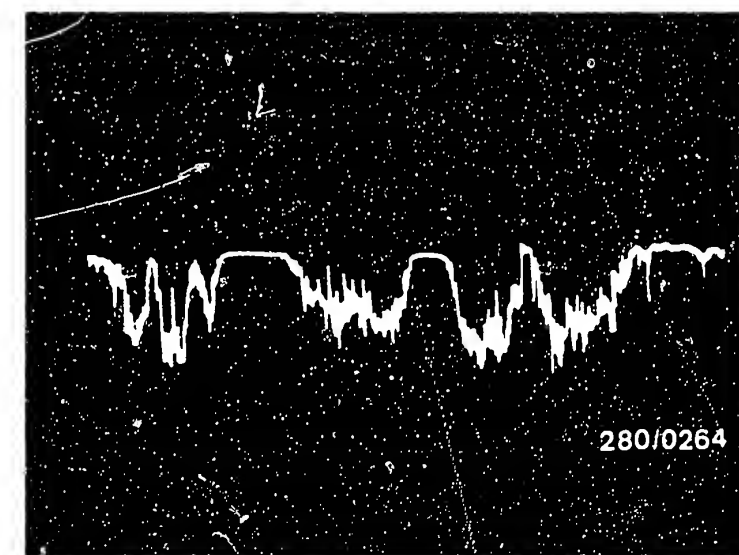
Potentiometer test (Noise test):

Leave plug connected. Set motortester to "special input" and connect air-flow sensor Term. 7 to red clip and Term. 6 to black clip. Move control lever all the way to the left (calibrated setting). Switch on ignition. Deflect air-flow sensor flap suddenly several times. If air-flow sensor O.K., a continuous stroke signal must be visible on the oscilloscope. If air-flow sensor defective, a noise signal appears similar to the one shown opposite. Replace air-flow sensor. After testing, check spring contacts for security.



- 1 = Air-flow sensor with NTC I
- 2 = Idle-mixture-adjusting screw

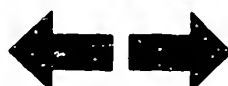
Noise signal of defective air-flow sensor



Continued on J17/J18

J15

Poor throttle take-up
BMW 525e



J16

Poor throttle take-up
BMW 525e



Poor throttle take-up (continued)

yes

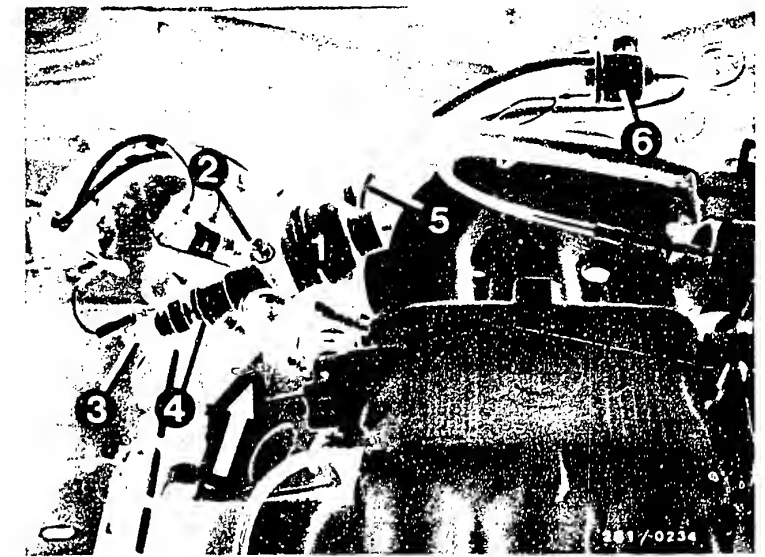
Are all hose lines and electric leads securely attached?
Visual examination.
Is the air-intake system leak-tight?

no

Check whether hoses of air-intake system and of fuel line system are securely attached, not kinked or damaged. If necessary, replace hoses. Eliminate leaks with new seals or by re-tightening the connecting screws.
Leak test: Seal off exhaust tail pipe. Take out air filter element and seal off air-flow sensor duct. Unscrew hose to idle-control valve and blow air (0.3 bar gauge pressure) into the intake manifold with a compressed-air gun. Seal off port on idle-control valve. Fully open throttle valve. Using soapy water, brush or spray all joints. Bubbling or foaming indicates a leak. Check electrical plug-in contacts for loose contacts.

yes

Continued on J19/J20



Arrow=hose to idle-control valve

J17

Poor throttle take-up
BMW 525e



J18

Poor throttle take-up
BMW 525e



Poor throttle take-up (continued)

yes

Electropneumatic idle-speed control (not from Bosch) O.K.?

no

yes

Continued on J23/J24

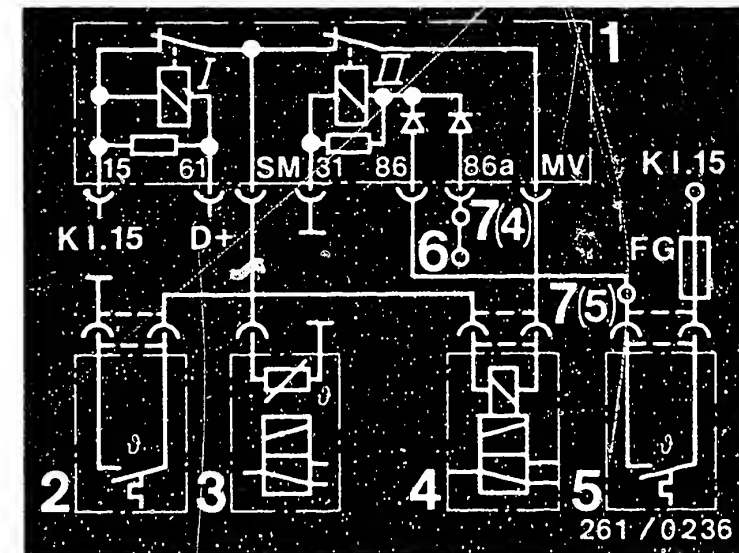
Operating principle of electropneumatic idle-speed control

The idle-speed control consists of the following components:

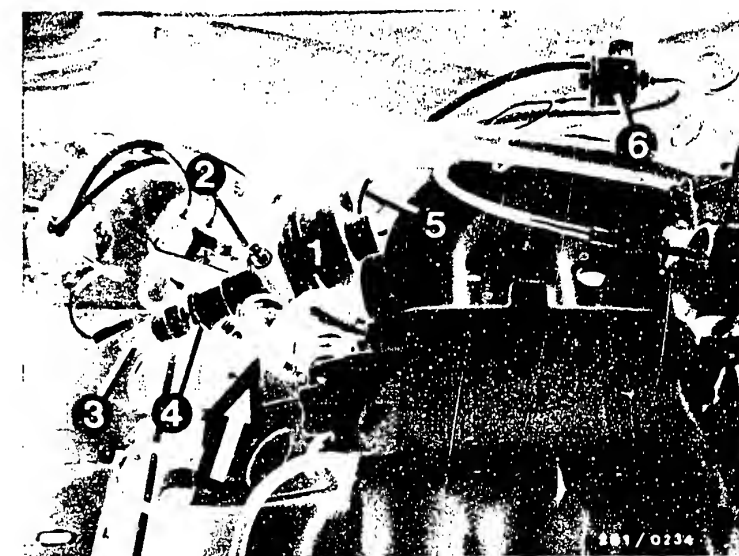
Idle-control valve (bottom picture -Item 1) with thermo-servo motor (3), relay, solenoid-operated valve (4), thermo-switch +45°C and air temperature sensor (0 °C). The air conditioner switch is also used for purposes of control. The idle-control valve acts as a variable bypass around the throttle valve and adjusts the air flow as a function of three overlapping influences:

1. Pneumatic adjusting of the opening cross-section with intake manifold pressure. The intake manifold pressure to the idle-control valve is blocked off by the solenoid-operated valve when the engine temperature is below +45°C and the air conditioner is on or if the air temperature is below 0 °C. Depending on outside temperature, a large cross-section is left open and the idle speed is raised to approx. 900 min⁻¹.
2. Adjusting of the opening cross-section with the thermo-servo motor. By means of electrical heating the opening cross-section is reduced in the warm-up phase.
3. Adjustable bypass for idle speed adjustment.

Continued on J21/J22



- 1=Relay for idle-speed control
- 2=Thermo-switch +45°C
- 3=Thermo-servo motor
- 4=Solenoid-operated valve
- 5=Thermo-switch, air 0 °C
- 6=to air-conditioner switch
- 7=Plug connection (6-pin; No. 4,5) in glove compartment



J19

Poor throttle take-up
BMW 525e



J20

Poor throttle take-up
BMW 525e



Testing the idle-speed control

1. Resistance measurements:

Thermo-servo motor: $15...25\ \Omega$ (at $+20^{\circ}\text{C}$)

Solenoid-op. valve: $18...45\ \Omega$

Thermo-switch $+45^{\circ}\text{C}$ (coolant):
below $+41^{\circ}\text{C}$ open ($\infty\ \Omega$)
above $+47^{\circ}\text{C}$ closed ($0\ \Omega$)

Thermo-switch 0°C (air):
below -8°C closed ($0\ \Omega$)
above $+4^{\circ}\text{C}$ open ($\infty\ \Omega$)

2. Voltage measurements with ignition on:

At relay between Term. 15 (+) and Term. D+:
battery voltage.

At solenoid-op. valve: no voltage.

At thermo-servo motor: no voltage.

3. Voltage measurements with engine running:

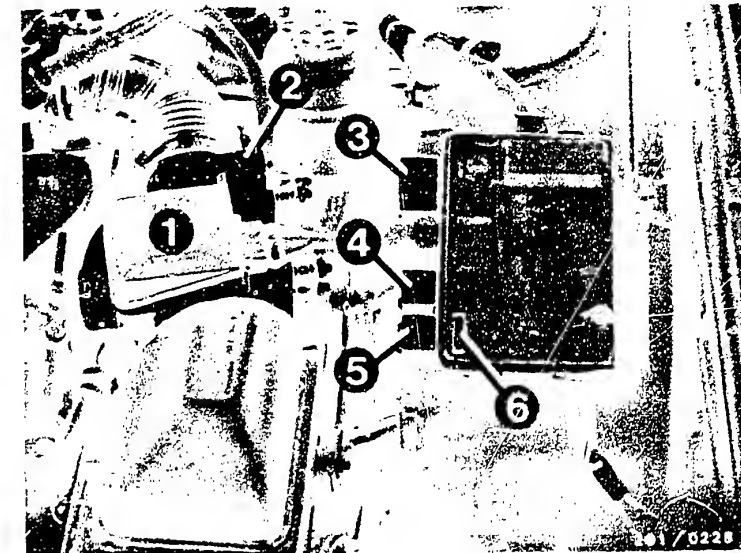
At thermo-servo motor: battery voltage.

At solenoid-operated valve with air conditioner
off, air temperature above $+4^{\circ}\text{C}$ and engine
temperature above 47°C : battery voltage.

At solenoid-operated valve either with air
conditioner on or air temperature below -8°C
or engine temperature below $+41^{\circ}\text{C}$: no voltage.

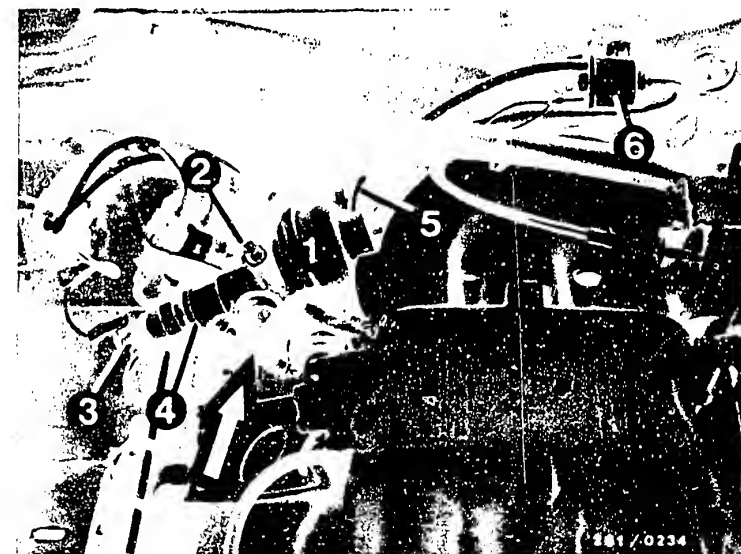
yes

Continued on J23/J24



3=Relay for idle-speed control

- 1=Idle-control valve
- 2=Idle adjusting screw
- 3=Thermo-servo motor
- 4=Lock nut
- 5=Hose to solenoid-operated valve
- 6=Solenoid-operated valve
- Arrow=Hose to idle-control valve



Poor throttle take-up (continued)

yes

4. Pneumatic test:

Solenoid-operated valve under voltage:

Valve open, air passage between intake manifold and idle-control valve.

Solenoid-operated valve deenergized:

Valve closed, atmospheric pressure is applied to the idle-control valve

Testing completed for customer complaint

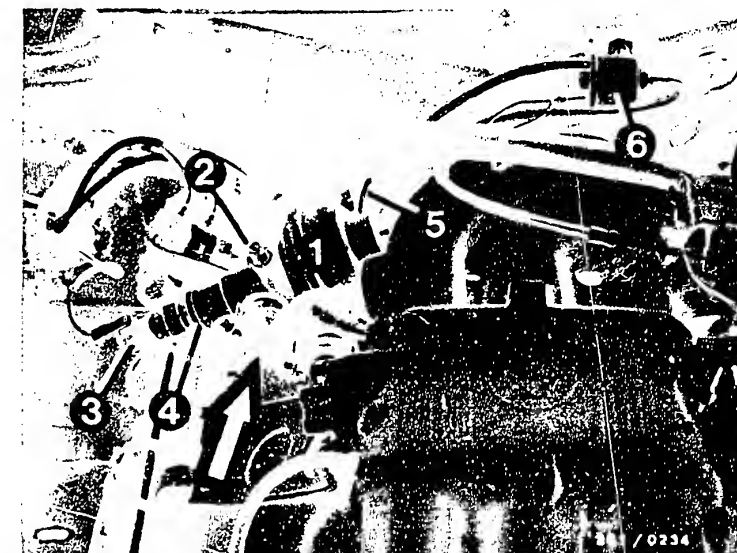
"Poor throttle take-up"

Customer complaint remedied?

no

Further possibilities:

- Customer complaint incorrectly diagnosed (See Coordinates C3...C10).
If the fault has not been detected by "direct trouble-shooting", see "detailed trouble-shooting" (Coordinates C3/C4).
- Engine not mechanically O.K. (Compression, valve setting, valve timing, worn camshaft).



6=Solenoid-operated valve

J23

Poor throttle take-up

BMW 525e



J24

Poor throttle take-up

BMW 525e



ENGINE MISSING UNDER ALL OPERATING CONDITIONS

Trouble-shooting program according to customer complaints

How to use the following trouble-shooting program

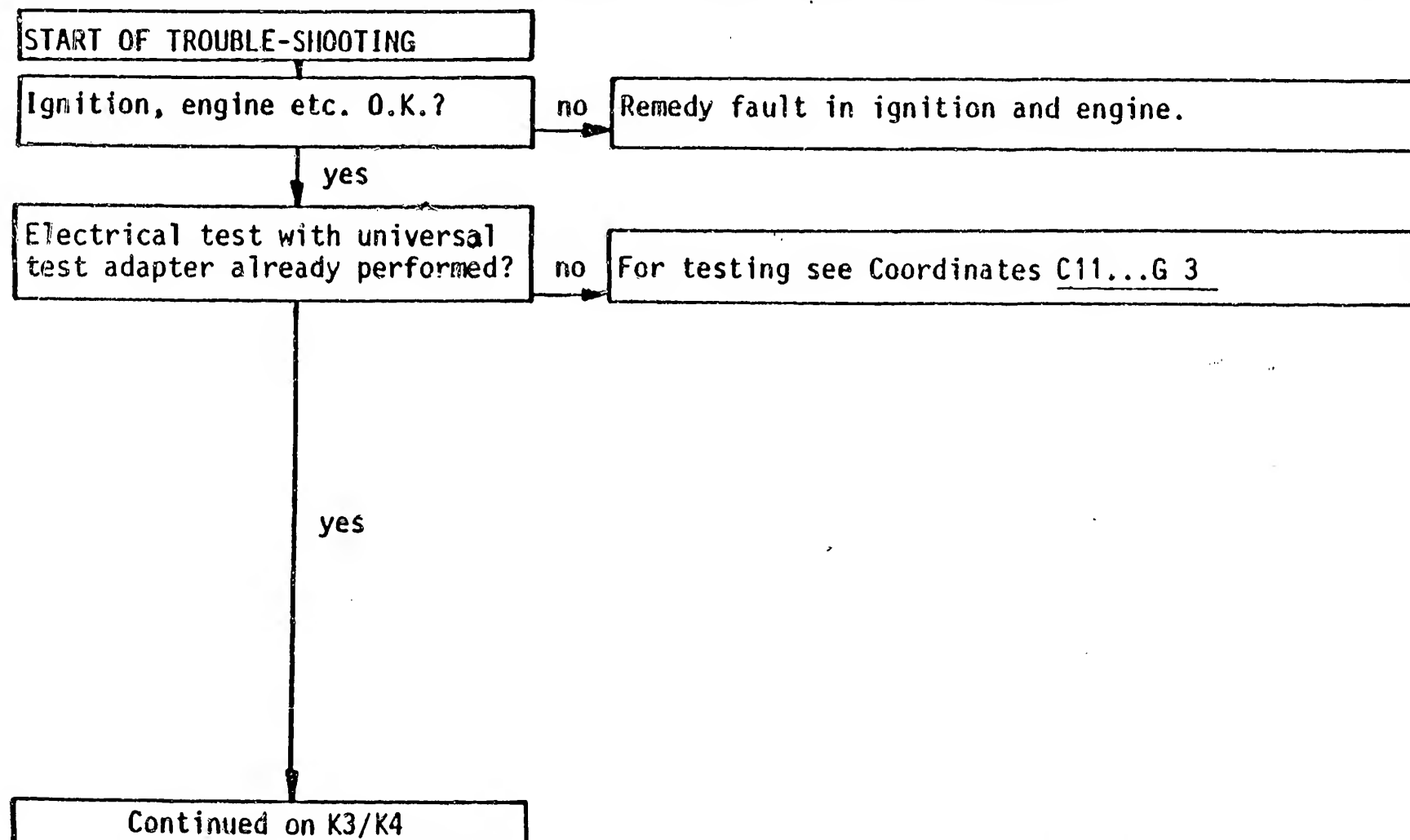
The program is divided into three rows of boxes:

- The left-hand row contains the questions on the tests.
- The middle row contains descriptions of the testing and adjustment operations on the components.
- The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.



K1

Engine missing
BMW 525e



K2

Engine missing
BMW 525e



Engine missing under all operating conditions (continued)

yes

Check secondary pattern of all cylinders.
Secondary pattern O.K.?

no

Check ignition coil and high-voltage section; distributor cap oil-fouled outside and inside? (Unscrew distributor rotor and check camshaft seal).

Note:

The distributor cap is fastened with 3 screws. To remove the distributor cap, it is necessary to remove the radiator cover.

When plugging on the H.T. ignition cables, pay attention to the cylinder numbers. Do not forget the cap and screening cover.

Check ignition coil primary for continuity (approx. 0 Ω). Secondary resistance: 5...7.2 k Ω . Test interference-suppression resistors, H.T. ignition cables and spark plugs.

Interference-suppression resistor in

Distributor rotor:	1 k Ω
Distributor domes:	1 k Ω each
Spark-plug connector:	5 k Ω each
Spark plugs:	0 k Ω
Ignition coil:	1 k Ω

yes

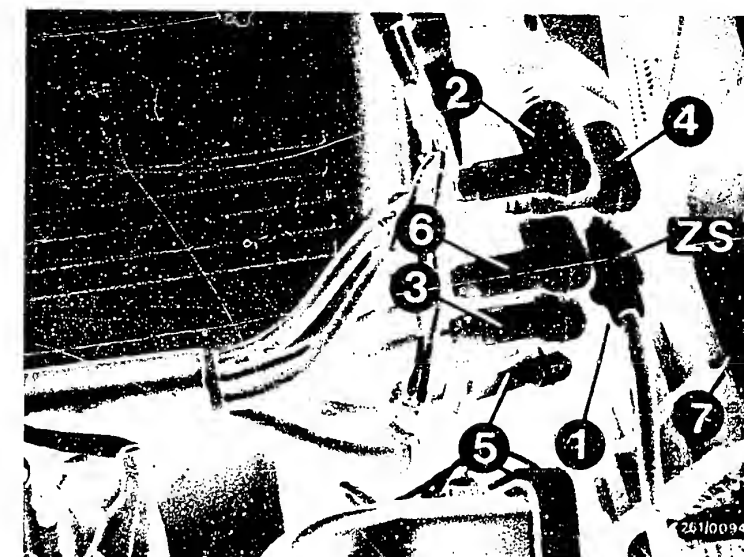
Plug-in connections of wiring harness and ground terminal O.K.?

no

Look for engine missing due to loose contacts as follows: Let the engine run, if possible on a chassis dynamometer. Keep the engine speed constant and watch for engine missing. Move the wiring harness and plug-in connections while doing this. Watch particularly for plug-in connections on engine-speed and reference-mark sensors. Ground terminal firmly secured? Check plug-in connections for security and corrosion. Spring contacts must be clipped in and must not move back. Check ground leads for continuity and loose contacts.

yes

Continued on K5/K6



High-voltage distributor

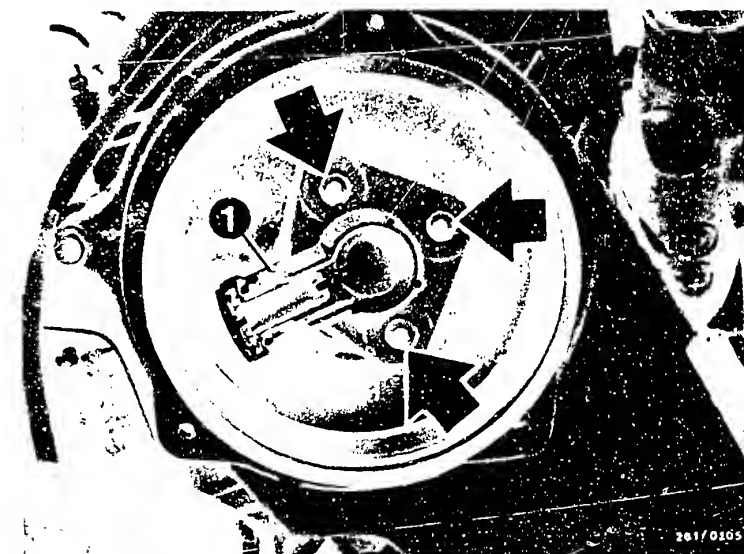
1 to 6 = cylinder numbers

ZS = High-tension lead to ignition coil

7 = Radiator cover

1 = Distributor rotor

Arrows = Fastening screws



K3

Engine missing
BMW 525e



K4

Engine missing
BMW 525e



Engine missing under all operating conditions (continued)

yes

Air-flow sensor mechanically
O.K.?

no

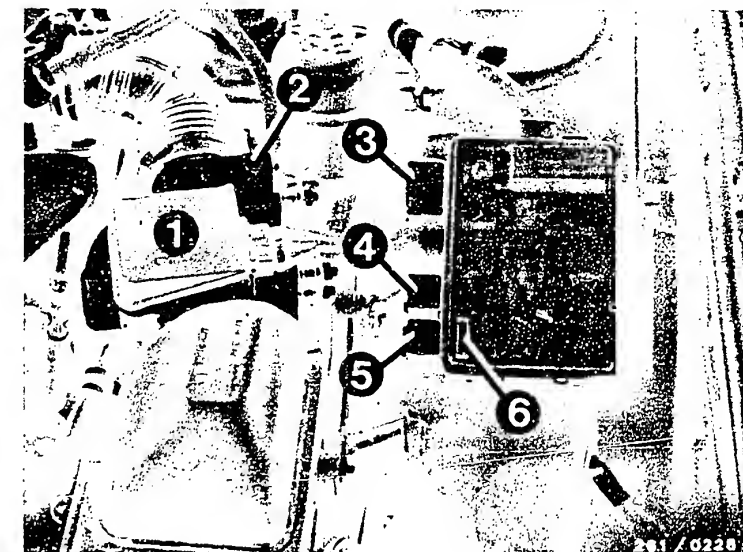
Testing: Open air-flow sensor flap by hand. It must be possible to open the air-flow sensor flap with uniform ease from its fully closed position to its fully open position. When released, the flap must close completely by itself. When the air-flow sensor flap is opened it must not catch at any point. Watch for any indications of abrasion or rubbing. Clean air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are any signs of abrasion or rubbing, replace the air-flow sensor.

Potentiometer test (Noise test):

Leave plug connected. Set motortester to "special input" and connect air-flow sensor Term. 7 to red clip and Term. 6 to black clip. Move control lever all the way to the left (calibrated setting). Switch on ignition. Deflect air-flow sensor flap suddenly several times. If air-flow sensor O.K., a continuous stroke signal must be visible on the oscilloscope. If air-flow sensor defective, a noise signal appears similar to the one shown opposite. Replace air-flow sensor. After testing, check spring contacts for security.

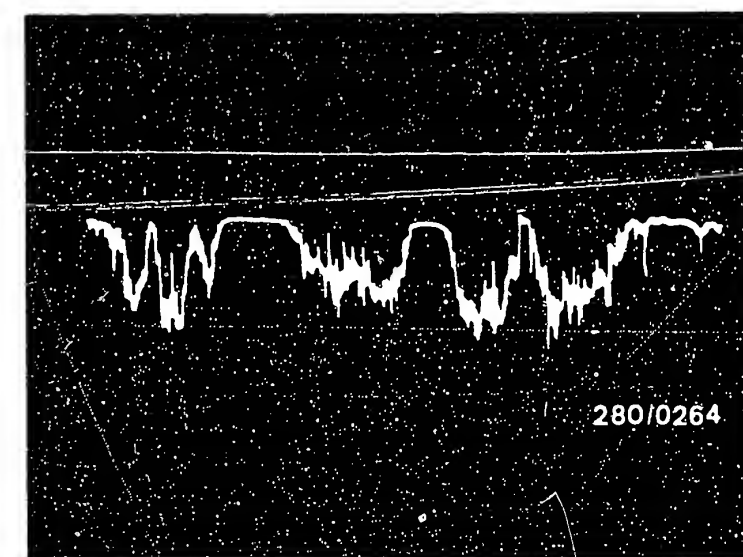
yes

Continued on K7/K8



1 = Air-flow sensor with NTC I
2 = Idle-mixture-adjusting screw

Noise signal of defective
air-flow sensor



K5

Engine missing
BMW 525e



K6

Engine missing
BMW 525e



Engine missing under all operating conditions (continued)

yes

Fuel delivery O.K.?

no

Measure fuel delivery:

For testing, undo junction between fuel return hose (from pressure regulator) and fuel return line (to fuel tank). Extend hose if necessary and lead into a 5 l vessel with graduated scale. Build up fuel pressure: on universal test adapter, set program switch "V" to 17. Switch on ignition and press button T 3.

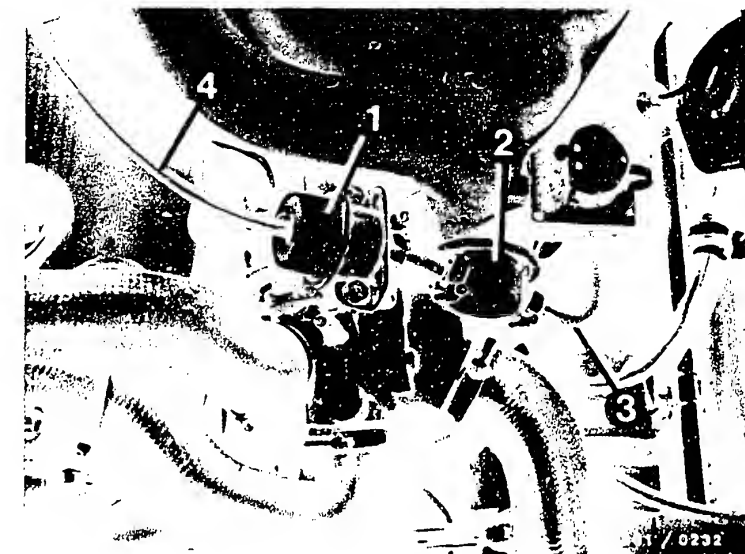
Test specification: min. 750 cm³/30 s

Remedy if test specification not reached:

- Fuel filter clogged → replace.
- Voltage at fuel pump plugs, with engine running, min. 12 V. If not, clean contacts. Possibly eliminate poor ground connection. Replace leads.
- Fuel pressure regulator defective - replace. The fuel pressure regulator is mounted on the fuel-distribution pipe by two fastening screws and an O-ring. After removing the pressure regulator, it is necessary to replace the O-ring and the flat ring (use parts set 1 287 010 704).

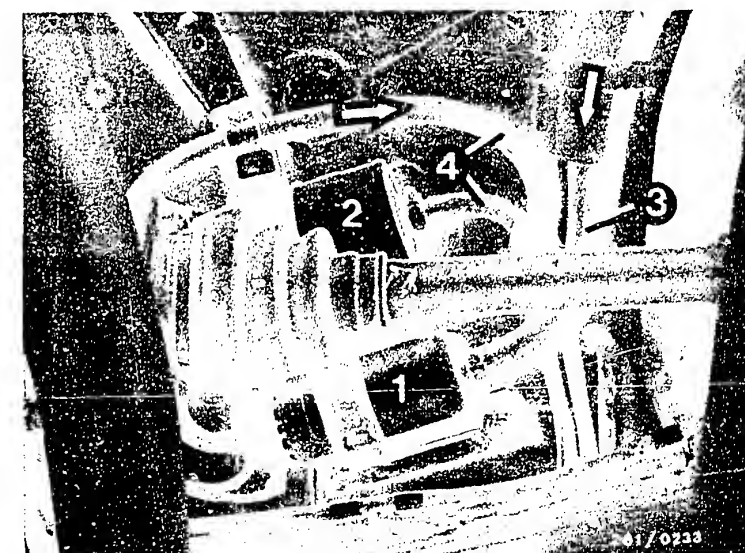
yes

Continued on K9/K10



- 1=Pressure regulator
- 2=Fuel-line-pressure damper
- 3=Fuel return hose
- 4=Air hose to intake manifold

- 1=Electric fuel pump
- 2=Fuel filter
- 3=Fuel intake line
- 4=Fuel delivery line
- Arrows=Direction of fuel flow



K7

Engine missing
BMW 525e



K8

Engine missing
BMW 525e



Engine missing under all operating conditions (continued)

yes

Burbling on the overrun?

no

1. Check exhaust system for leaks.

2. Throttle valve closed?

Check whether the throttle valve can be closed still further and whether the engine speed thereby drops.

Visual examination:

Loosen hose clamp and push back charge-air tube.

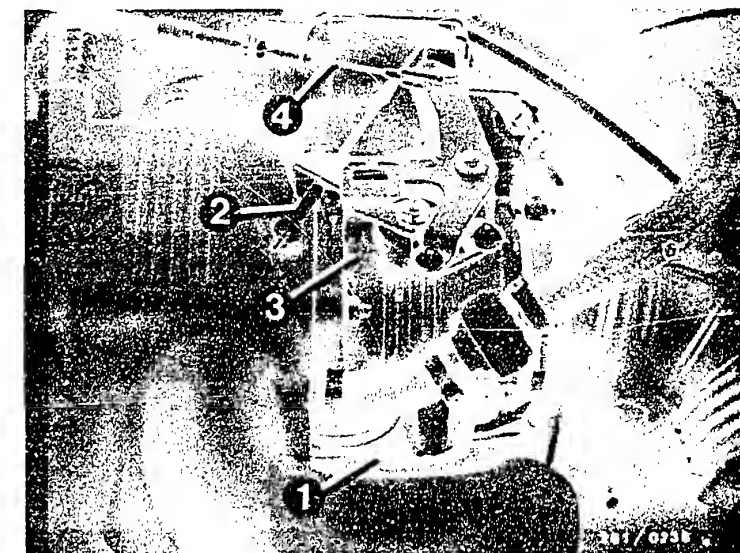
Throttle valve set to hair's breadth gap?

If necessary, make adjustment at idle stop screw.

After correcting, readjust throttle cable, micro-switch and potentiometer (part of knock control).

yes

Continued on K11/K12



1=Throttle-valve switch

2=Throttle cable

3=Idle stop screw

4=Cable to automatic transmission

K9

Engine missing
BMW 525e



K10

Engine missing
BMW 525e



Engine missing under all operating conditions (continued)

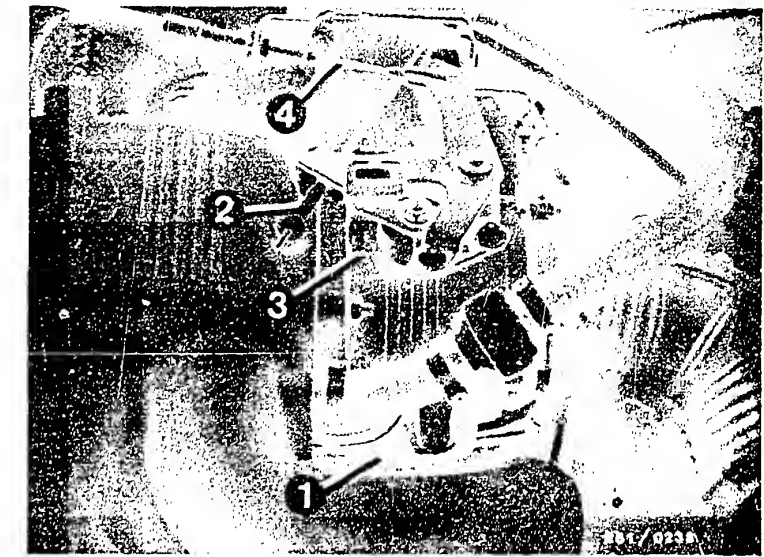
yes

Adjusting the throttle-valve switch

Slightly loosen fastening screws. Connect ohm-meter to throttle-valve switch Term. 2 and ground. Turn actuating lever to "wide-open throttle" and slowly return to idle stop. Turn throttle-valve switch until the inner stop can be felt (Reading 0 Ω). Tighten screws.

Checking the adjustment:

Pull slightly on throttle cable. The idle contact must click (reading $\infty \Omega$).



- 1=Throttle-valve switch
- 2=Throttle cable
- 3=Idle stop screw
- 4=Cable to automatic transmission

Control unit O.K.?

no

Let engine run. Shake control unit lightly and move multiple plug. Watch for engine missing. Repair plug-in connection on multiple or replace defective control unit.

yes

Continued on K13/K14

K11

Engine missing
BMW 525e

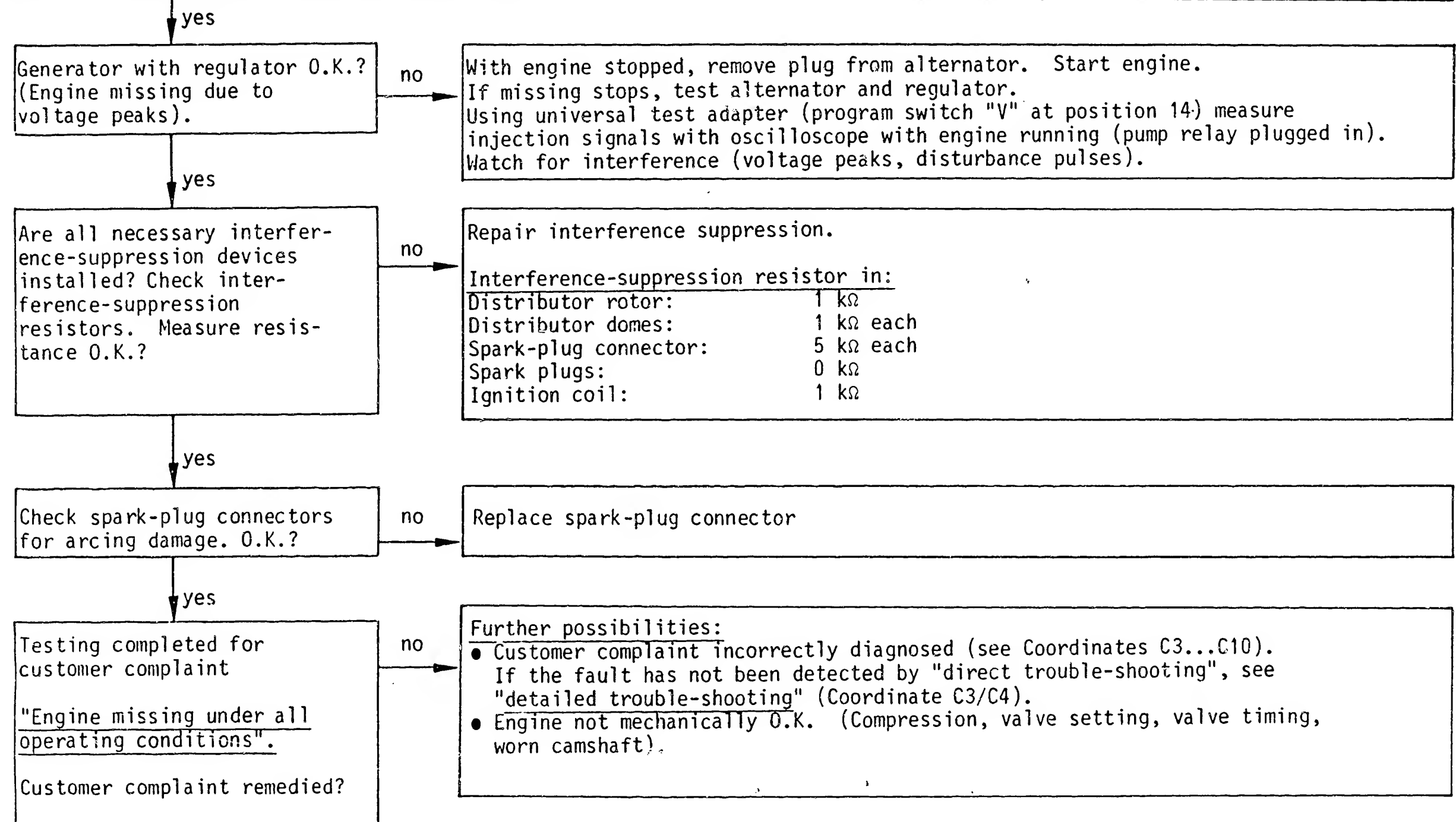


K12

Engine missing
BMW 525e



Engine missing under all operating conditions (continued)



K13

Engine missing
BMW 525e



K14

Engine missing
BMW 525e



FUEL CONSUMPTION TOO HIGH

Trouble-shooting program according to customer complaints

How to use the following trouble-shooting program

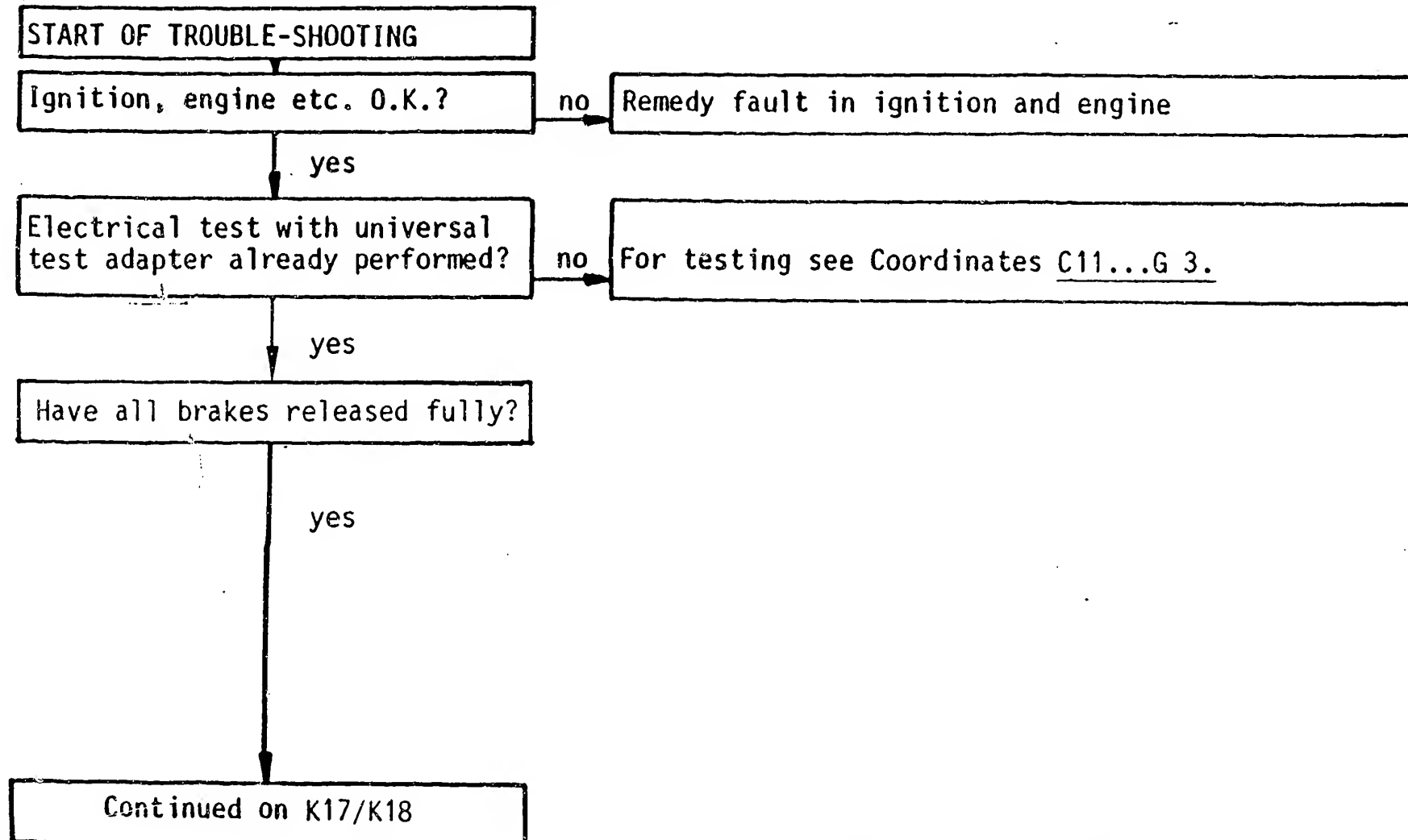
The program is divided into three rows of boxes:

- The left-hand row contains the questions on the tests.
- The middle row contains descriptions of the testing and adjustment operations on the components.
- The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.



K15

Fuel consumption too high

BMW 525e



K16

Fuel consumption too high

BMW 525e



Fuel consumption too high (continued)

yes

Check secondary pattern of all cylinders. Secondary pattern O.K.?

no

Check ignition coil and high-voltage section; distributor cap oil-fouled outside and inside? (Unscrew distributor rotor and check camshaft seal).

Note:

The distributor cap is fastened with 3 screws. To remove the distributor cap, it is necessary to remove the radiator cover.

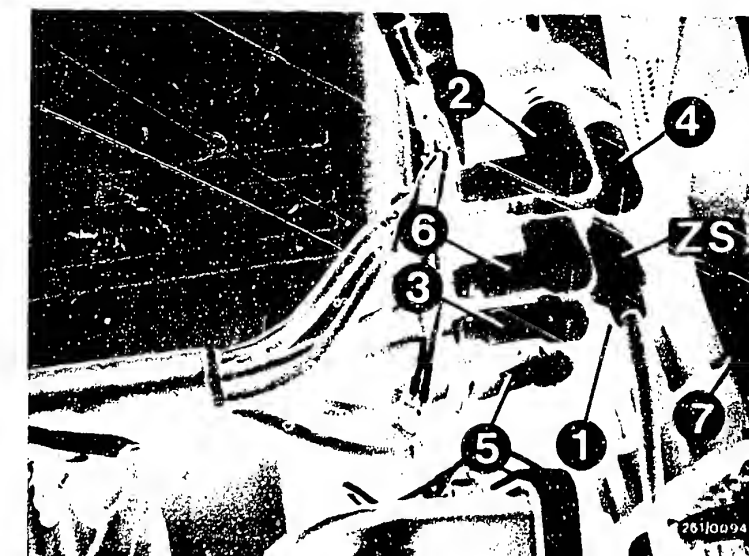
When plugging on the H.T. ignition cables, pay attention to the cylinder numbers. Do not forget the cap and screening cover.

Check ignition coil primary for continuity (approx. $0\ \Omega$). Secondary resistance: $5...7.2\ k\Omega$. Test interference-suppression resistors, H.T. ignition cables and spark plugs.

Interference-suppression resistor in

Distributor rotor:	$1\ k\Omega$
Distributor domes:	$1\ k\Omega$ each
Spark-plug connector:	$5\ k\Omega$ each
Spark plugs:	$0\ k\Omega$
Ignition coil:	$1\ k\Omega$

yes



High-voltage distributor

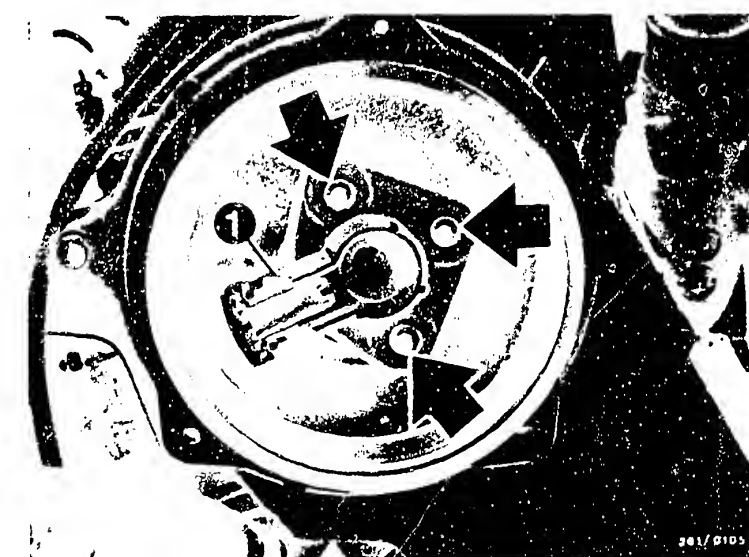
1 to 6 = cylinder numbers

ZS = High-tension lead to ignition coil

7 = Radiator cover

1 = Distributor rotor

Arrows = Fastening screws



Continued on K19/K20

K17

Fuel consumption too high

BMW 525e



K18

Fuel consumption too high

BMW 525e



Fuel consumption too high (continued)

yes

Air-flow sensor O.K.?

no

Testing: Open air-flow sensor flap by hand. It must be possible to open the air-flow sensor flap with uniform ease from its fully closed position to its fully open position. When released, the flap must close completely by itself. When the air-flow sensor flap is opened it must not catch at any point. Watch for any indications of abrasion or rubbing. Clean air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are any signs of abrasion or rubbing, replace the air-flow sensor.

yes

Solenoid-operated injection valves leak-tight?

no

Removing the injection valves and testing for leaks

Loosen fastening screws on fuel-distribution pipe. Pull fuel-distribution pipe upward until the injection valves are out of the holes in the intake ports. Do not damage nozzle needles or rubber seals.

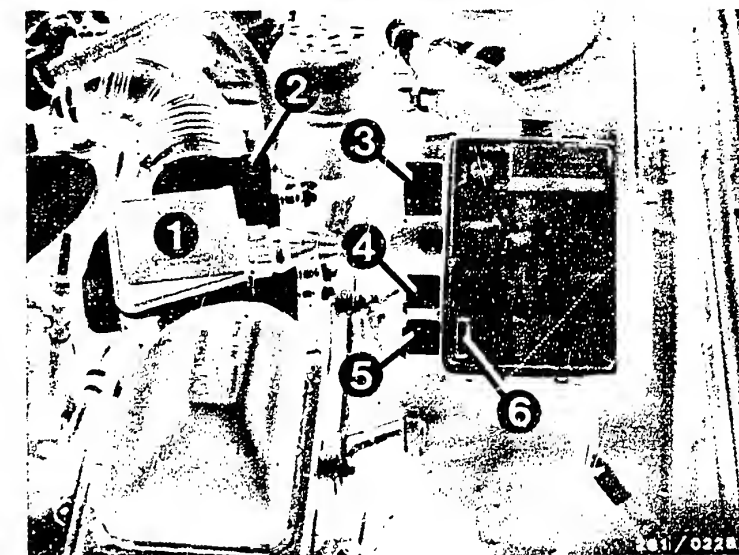
Build up fuel pressure:
On universal test adapter program switch "V" at 17.
Switch on ignition and press button T 3.

Check nozzle needle and environs for leaks and deposits.

yes

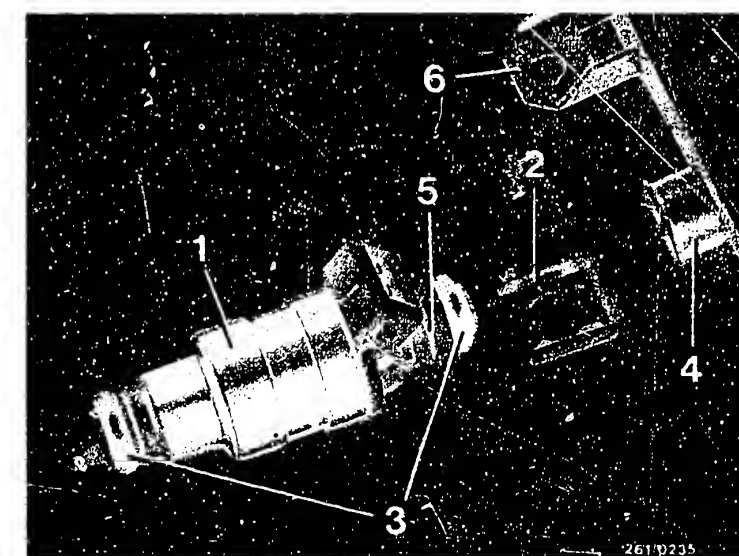
Continued on K23/K24

Continued on K21/K22



1 = Air-flow sensor with NTC I
2 = Idle-mixture-adjusting screw

1=Injection valve
2=Holding clamp
3=Rubber seal (O-ring)
4=Fuel-distribution pipe connection
5=Groove
6=Fastening strap



K19

Fuel consumption too high
BMW 525e



K20

Fuel consumption too high
BMW 525e



Fuel consumption too high (continued)

Remove electrical connector. Carefully withdraw holding clamps out of groove and pull injection valve out of fuel-distribution pipe connection.

Caution

Catch any escaping fuel. Do not allow to drip onto hot parts of the engine. Fire hazard.

Caution

Protection sleeve must not be levered off.

Installation of the injection valves

Damaged or swollen O-rings must be replaced.

Use parts set 1 287 010 704.

Cut through lower O-ring (intake port).

Caution: do not damage protection sleeve.

Fit new O-ring over protection sleeve and its bead. Do not damage any parts.

Before installing, check both rubber seals for proper seating.

Mount injection valves on fuel distribution pipe.

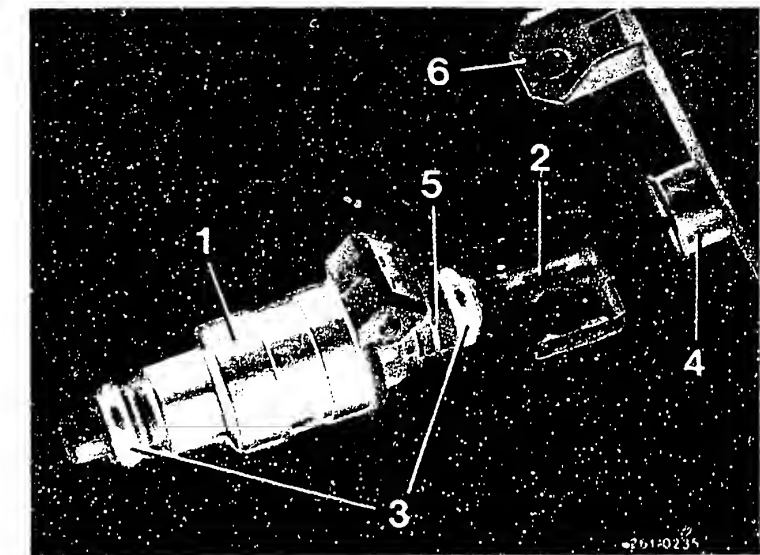
Press all 4 injection valves simultaneously into their seats with the fuel-distribution pipe.

Secure the fuel-distribution pipe. Check all air and fuel hoses for security.

Make the electrical connections.

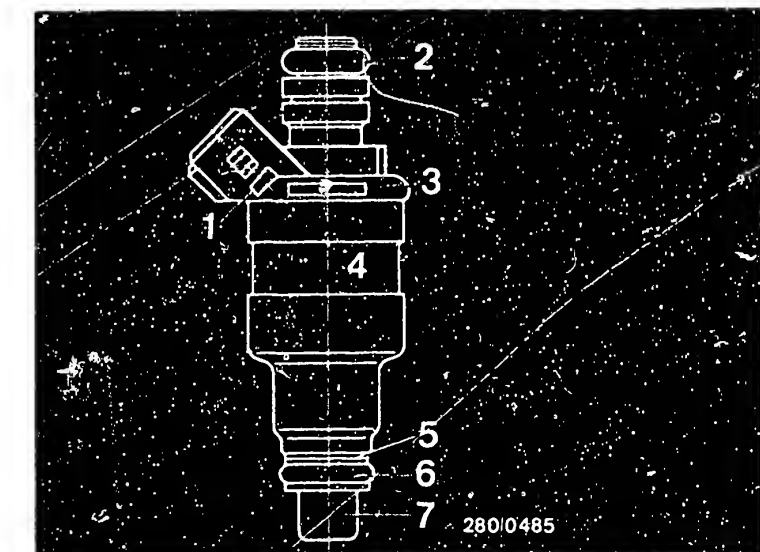
Start the engine and check whether any unmetered air is being drawn in.

yes



- 1=Injection valve
- 2=Holding clamp
- 3=Rubber seal (O-ring)
- 4=Fuel-distribution pipe connection
- 5=Groove
- 6=Fastening strap

- 2=upper O-ring
- 6=lower O-ring
- 7=Protection sleeve



Continued on K23/K24

K21

Fuel consumption too high

BMW 525e



K22

Fuel consumption too high

BMW 525e



Fuel consumption too high (continued)

yes

With engine at normal operating temperature, set idle speed with idle screw to

650...750 min⁻¹

With engine at normal operating temperature, set CO adjusting screw to

0,5...1,5 % by vol. CO

yes

Testing completed for customer complaint

"Fuel consumption too high".

Customer complaint remedied?

no

- Adjust idle speed at idle-adjusting screw in idle-control valve.
- Adjust exhaust gas with idle-mixture-adjusting screw (hexagon-socket-head AF 5) in air-flow sensor. To do this, remove plug.

If CO cannot be adjusted:

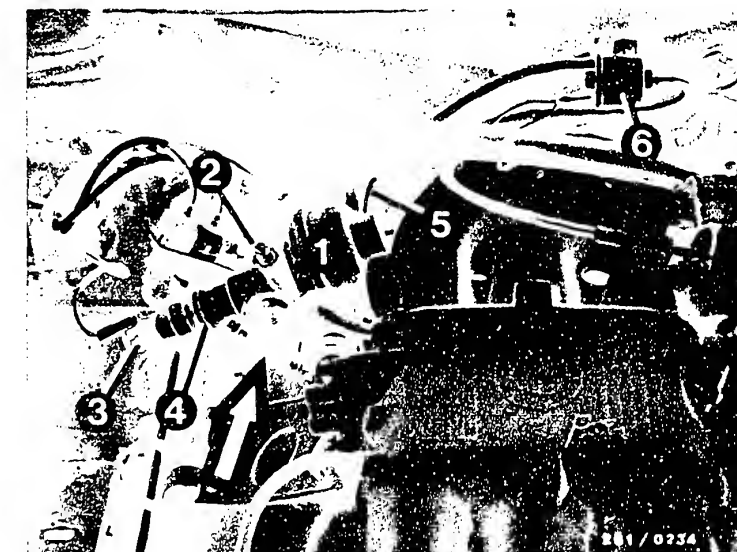
- CO concentration too low: Repeat leak test on air-intake system.
- CO concentration too high: Replace air-flow sensor.

Note: Use new plug (red) in air-flow sensor after CO adjustment.

no

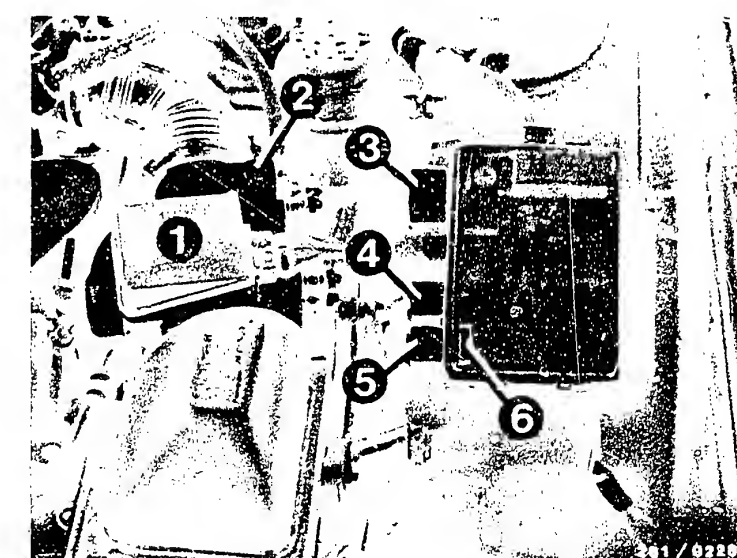
Further possibilities:

- Customer complaint incorrectly diagnosed (see Coordinates C3...C10). If the fault has not been detected by "direct trouble-shooting", see "detailed trouble shooting" (Coordinates C3/C4).
- Engine not mechanically O.K. (compression, valve setting, valve timing, worn camshaft).



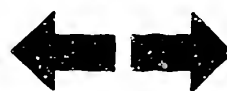
1=Idle-control valve
2=Idle-adjusting screw

1=Air-flow sensor with NTC I
2=Idle-mixture-adjusting screw



K23

Fuel consumption too high
BMW 525e



K24

Fuel consumption too high
BMW 525e



NO MAXIMUM ENGINE POWER, TOP SPEED NOT REACHED

Trouble-shooting program according to customer complaints

How to use the following trouble-shooting program

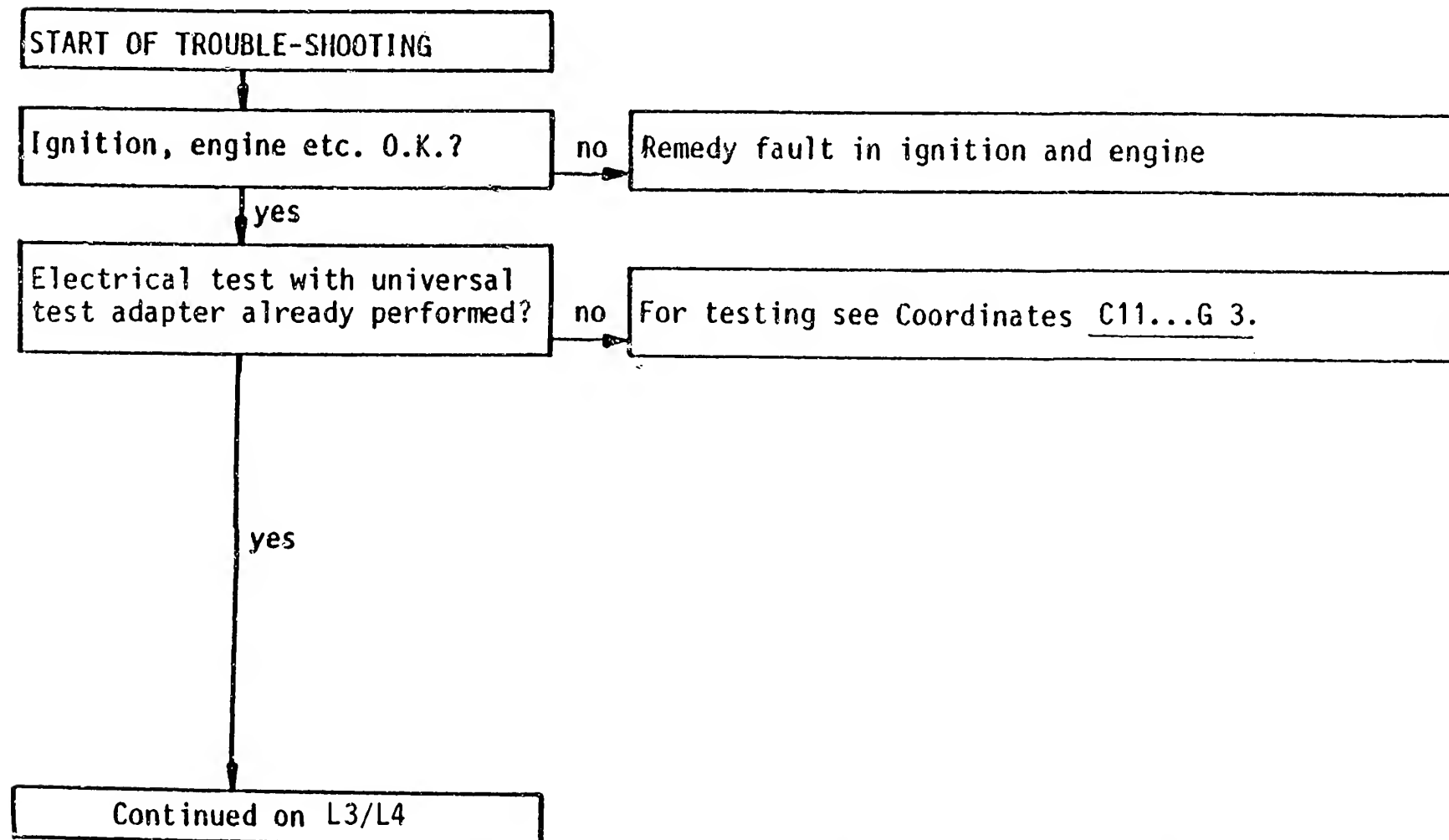
The program is divided into three rows of boxes:

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- The middle row contains descriptions of the testing and adjustment operations on the components.
- The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.



L1

No maximum engine power
BMW 525e



L2

No maximum engine power
BMW 525e



No maximum engine power / top speed not reached (continued)

☒ yes

Check secondary pattern of all cylinders.
Secondary pattern O.K.?

no

Check ignition coil and high-voltage section; distributor cap oil-fouled outside and inside? (Unscrew distributor rotor and check camshaft seal).

Note:

The distributor cap is fastened with 3 screws. To remove the distributor cap, it is necessary to remove the radiator cover.

When plugging on the H.T. ignition cables, pay attention to the cylinder numbers. Do not forget the cap and screening cover.

Check ignition coil primary for continuity (approx. $0\ \Omega$). Secondary resistance: 5...7.2 k Ω . Test interference-suppression resistors, H.T. ignition cables and spark plugs.

Interference-suppression resistor in

Distributor rotor: 1 k Ω

Distributor domes: 1 k Ω each

Spark-plug connector:	5 k Ω each
-----------------------	-------------------

Spark plug:	0 kΩ
Spark plugs:	0 kΩ

Ignition coil:	1 k Ω
----------------	--------------

yes

Does throttle valve open fully?

no

Throttle cable, accelerator O.K.? Accelerator
may stick due to floor mat etc.
Adjust throttle cable.
Check pressure point for "kickdown".

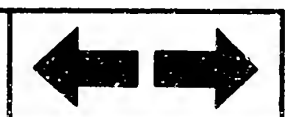
yes

Continued on L5/L6

L3

No maximum engine power

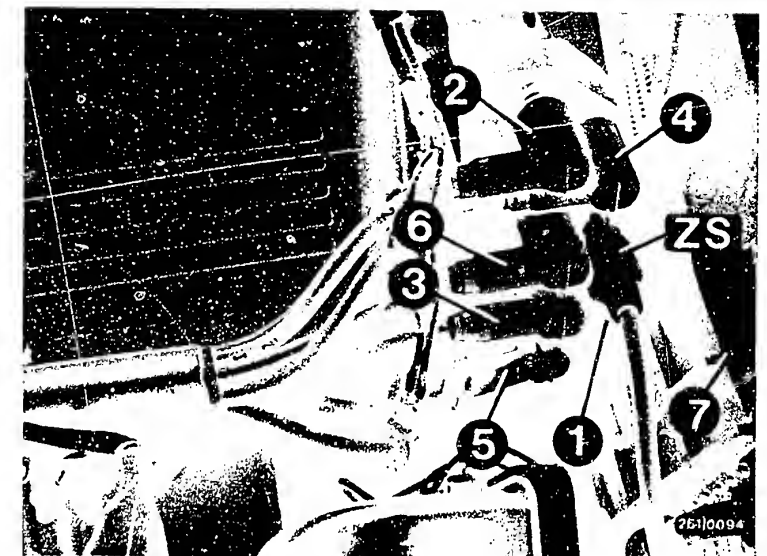
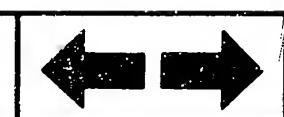
BMW 525e



L4

No maximum engine power

BMW 525e



High-voltage distributor

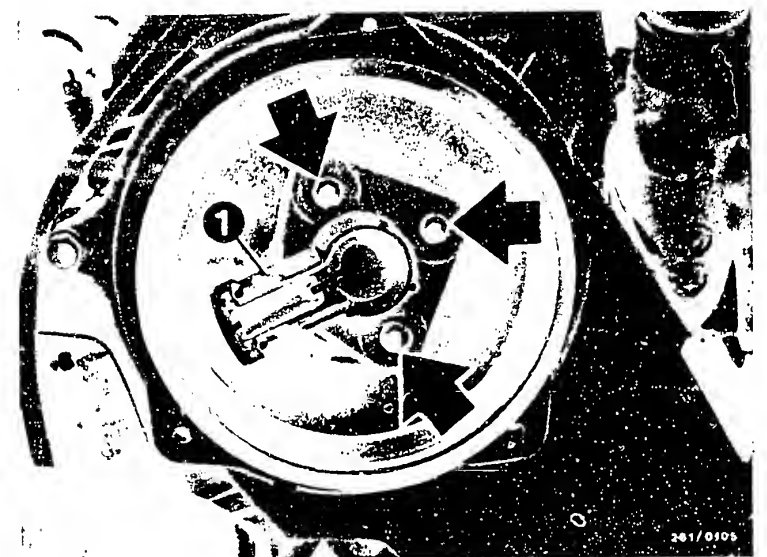
1 to 6 = cylinder numbers

ZS = High-tension lead to ignition coil

7 = Radiator cover

1 = Distributor rotor

Arrows = Fastening screws



No maximum engine power / top speed not reached (continued)

yes

Air-flow sensor O.K.?

no

Testing: Open air-flow sensor flap by hand. It must be possible to open the air-flow sensor flap with uniform ease from its fully close position to its fully open position. When released, the flap must close completely by itself. When the air-flow sensor flap is opened it must not catch at any point. Watch for any indications of abrasion or rubbing. Clean air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are any signs of abrasion or rubbing, replace the air-flow sensor.

yes

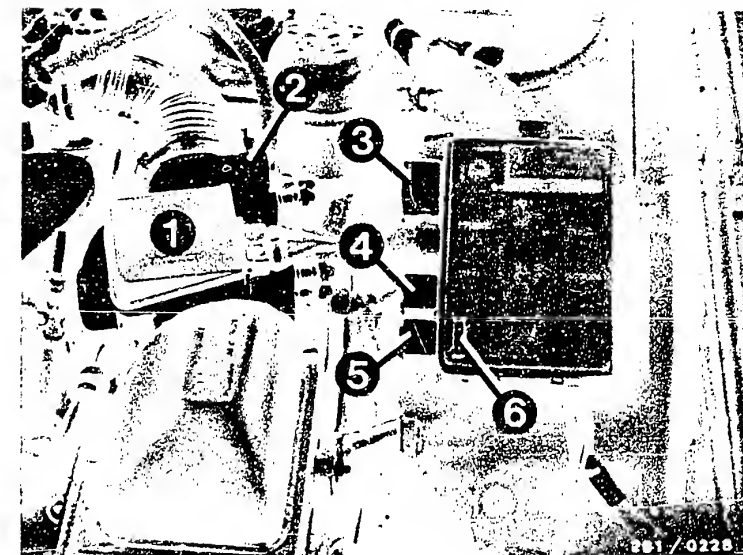
Air intake clear?

no

• Air filter clogged.

yes

Continued on L7/L8



1 = Air-flow sensor with NTC I
2 = Idle-mixture-adjusting screw

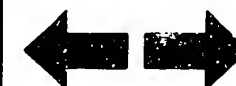
L5

No maximum engine power
BMW 525e



L6

No maximum engine power
BMW 525e



No maximum engine power / top speed not reached (continued)

yes

Fuel delivery O.K.?

no

Measure fuel delivery:

For testing, undo junction between fuel return hose (from pressure regulator) and fuel return line (to fuel tank). Extend hose if necessary and lead into a 5 l vessel with graduated scale. Build up fuel pressure: on universal test adapter, set program switch "V" to 17. Switch on ignition and press button T 3.

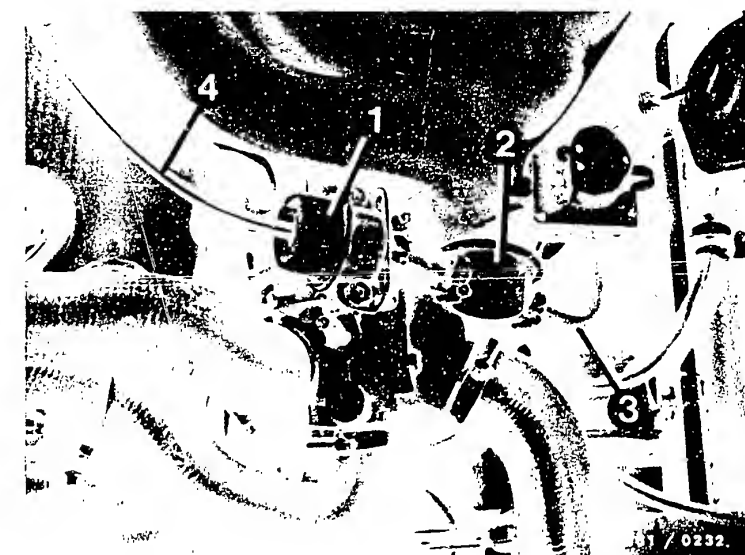
Test specification: min. 750 cm³/30 s

Remedy if test specification not reached:

- Fuel filter clogged → replace
- Voltage at fuel pump plugs, with engine running min. 12 V → clean contacts, possibly eliminate poor ground connection, replace leads.
- Fuel pressure regulator defective → replace
- Fuel pump delivery too low → replace fuel pump.
- Strainer in tank clogged? Corrosion in tank?

yes

Continued on L9/L10



- 1=Pressure regulator
2=Fuel-line-pressure damper
3=Fuel return hose
4=Air hose to intake manifold

L7

No maximum engine power
BMW 525e



L8

No maximum engine power
BMW 525e



No maximum engine power/top speed cannot be reached (continued)

yes

Fuel pressure at full load O.K.?

no

yes

Mount pressure gauge on fuel-distribution pipe (delivery line).

Caution:

Catch any escaping fuel.

Danger of fire with hot engine and electric sparks

Let engine idle:

Fuel pump pressure approx. 2.0 bar.

Remove air hose to intake manifold on pressure regulator:

Fuel pump pressure: 2.3...2.7 bar (reading may fluctuate slightly). Reconnect air hose. Test fuel pressure on chassis dynamometer at rated speed and at rated power:

Fuel pressure at full load:

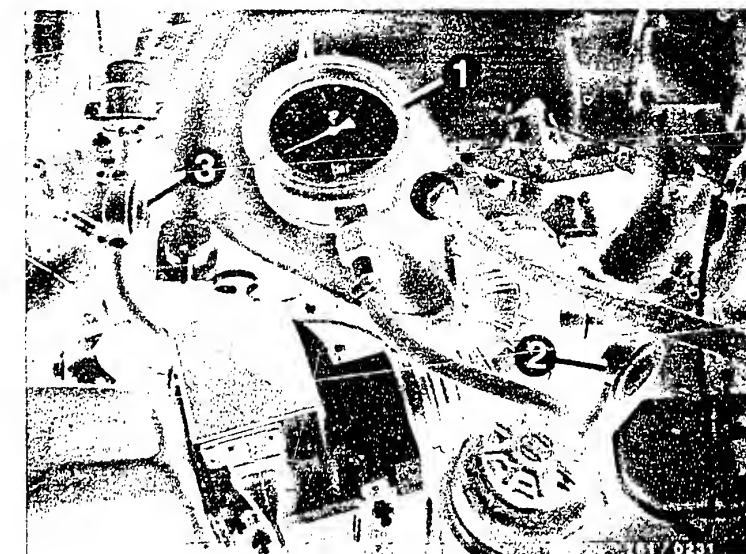
2.3...2.7 bar (reading may fluctuate slightly).

Trouble-shooting:

- Fuel filter clogged → replace.
- Voltage at fuel pump plugs, with engine running, min. 12 V. If not, clean contacts; possibly eliminate poor ground connection, replace leads.

Continued on L13/L14

Continued on L11/L12



1=Pressure gauge

2=Fuel-line-pressure damper in fuel delivery line

3=Fuel-line-pressure damper in fuel return line

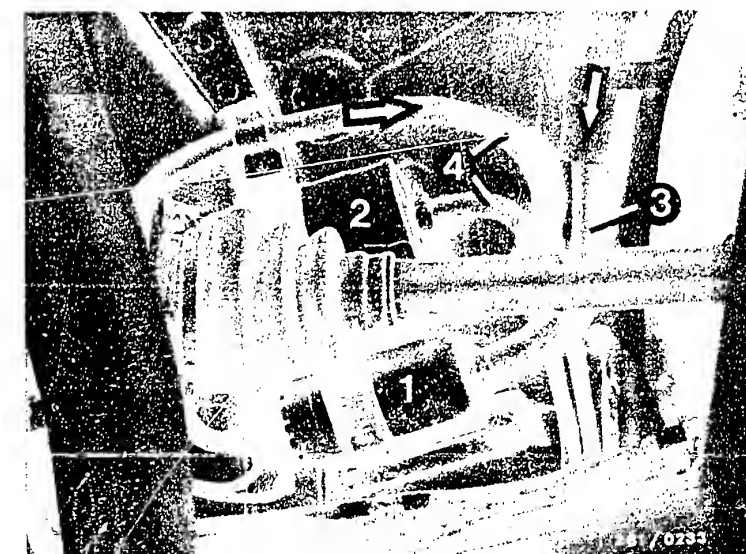
1 = Electric fuel pump

2 = Fuel filter

3 = Fuel intake line

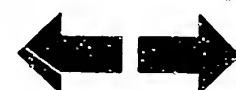
4 = Fuel delivery line

Arrow = Direction of fuel flow



L9

No maximum engine power
BMW 525e



L10

No maximum engine power
BMW 525e

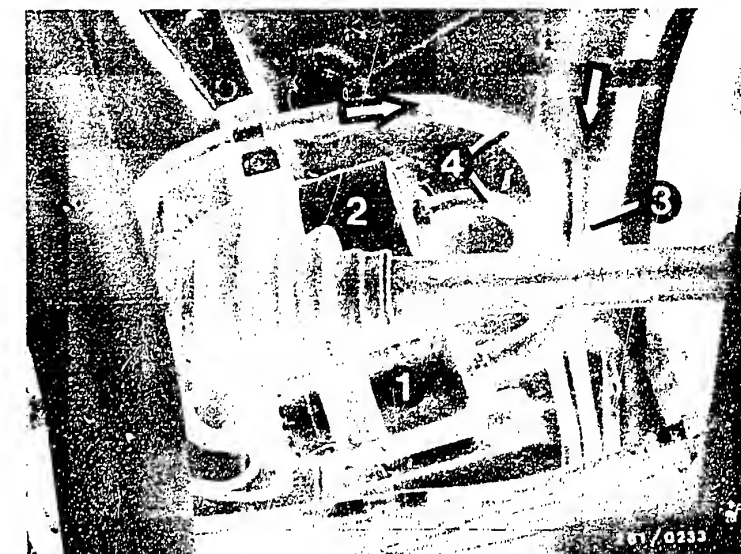


No maximum engine power / top speed not reached (continued)

Trouble-shooting (continued)

- Fuel pressure regulator defective - replace. The fuel pressure regulator is mounted on the fuel-distribution pipe by two fastening screws and an O-ring. After removing the pressure regulator, it is necessary to replace the O-ring and the flat ring (use parts set 1 287 010 704).
- Fuel pump delivery too low → replace fuel pump.
- Strainer in tank clogged? Corrosion in tank?

yes



1=Electric fuel pump
2=Fuel filter
3=Fuel intake line
4=Fuel delivery line
Arrows=Direction of fuel flow

Continued on L13/L14

L11

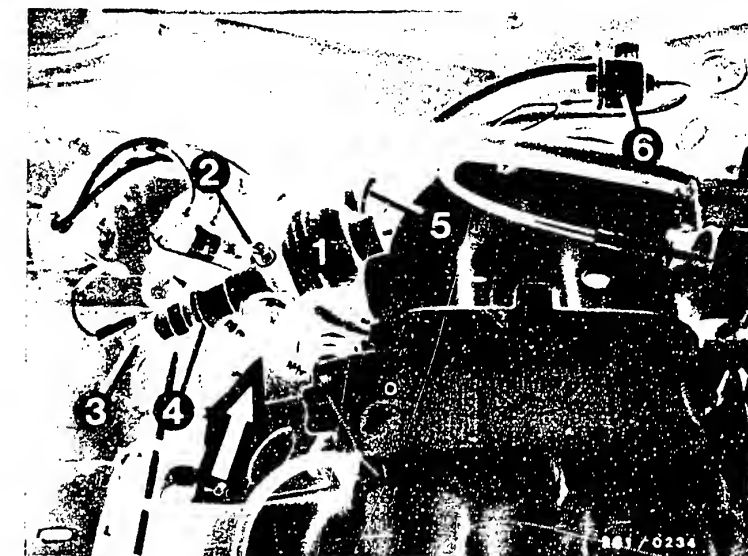
No maximum engine power
BMW 525e



L12

No maximum engine power
BMW 525e





Arrow=hose to idle-control valve

No maximum engine power / top speed not reached (continued)

yes

Are all hose lines and electric leads securely attached?
Visual examination.
Is the air-intake system leak-tight?

no

Check whether hoses of air-intake system and of fuel line system are securely attached, not kinked or damaged. If necessary, replace hoses. Eliminate leaks with new seals or by re-tightening the connecting screws.
Leak test: Seal off exhaust tail pipe. Take out air filter element and seal off air-flow sensor duct. Unscrew hose to idle-control valve and blow air (0.3 bar gauge pressure) into the intake manifold with a compressed-air gun. Seal off port on idle-control valve. Fully open throttle valve. Using soapy water, brush or spray all joints. Bubbling or foaming indicates a leak. Check electrical plug-in contacts for loose contacts.

yes

Testing completed for customer complaint

"No maximum engine power".

Customer complaint remedied?

no

Further possibilities:

- Customer complaint incorrectly diagnosed (see Coordinates C3...C10). If the fault has not been detected by "direct trouble-shooting", see "detailed trouble-shooting" (Coordinate C3/C4).
- Engine not mechanically O.K. (Compression, valve setting, valve timing, worn camshaft).
- Knock control not O.K. Test in accordance with SIS microcard BMW-04/E181.

L13

No maximum engine power

BMW 525e



L14

No maximum engine power

BMW 525e



CO-ADJUSTMENT AT IDLE TOO LOW OR TOO HIGH

Trouble-shooting program according to customer complaints

How to use the following trouble-shooting program

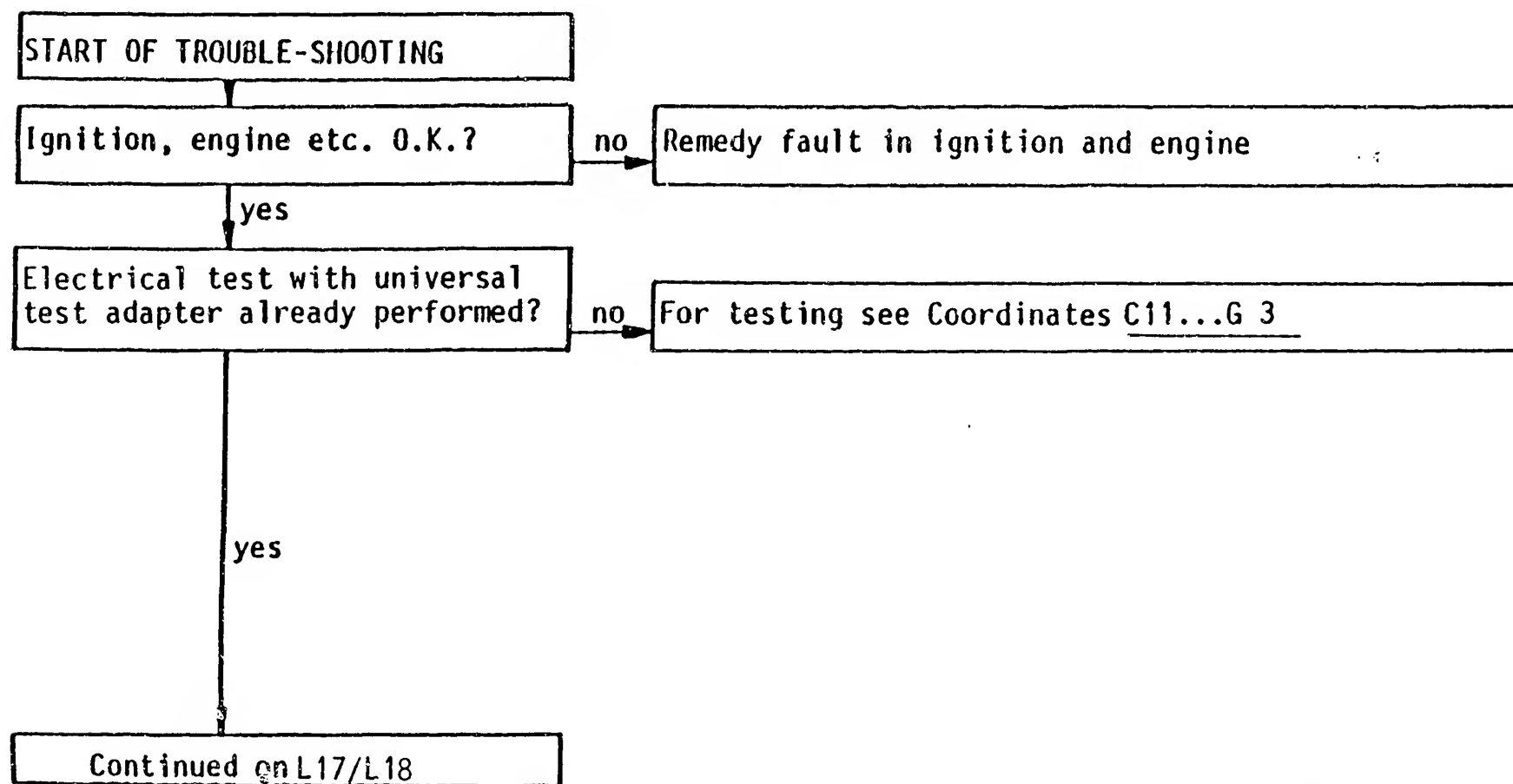
The program is divided into three rows of boxes:

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- The middle row contains descriptions of the testing and adjustment operations on the components.
- The right-hand row contains the illustrations belonging to the text and explains the illustrations.

If the questions can be answered conclusively with "yes" without testing, proceed to the next question below.

If, on the other hand, the answer to the question is "no", and you suspect a fault, branch to the middle row of boxes and carry out the tests given there.

When you have finished testing continue trouble-shooting at the point at which you branched off.



L15

CO adjustment
BMW 525e



L16

CO adjustment
BMW 525e



CO adjustment at idle too low or too high (continued)

yes

Check secondary pattern of all cylinders.
Secondary pattern O.K.?

no

Check ignition coil and high-voltage section; distributor cap oil-fouled outside and inside? (Unscrew distributor rotor and check camshaft seal).
Note:
The distributor cap is fastened with 3 screws. To remove the distributor cap, it is necessary to remove the radiator cover.
When plugging on the H.T. ignition cables, pay attention to the cylinder numbers. Do not forget the cap and screening cover.
Check ignition coil primary for continuity (approx. $0\ \Omega$). Secondary resistance: $5...7.2\ k\Omega$. Test interference-suppression resistors, H.T. ignition cables and spark plugs.
Interference-suppression resistor in

Distributor rotor:	$1\ k\Omega$
Distributor domes:	$1\ k\Omega$ each
Spark-plug connector:	$5\ k\Omega$ each
Spark plugs:	$0\ k\Omega$
Ignition coil:	$1\ k\Omega$

yes

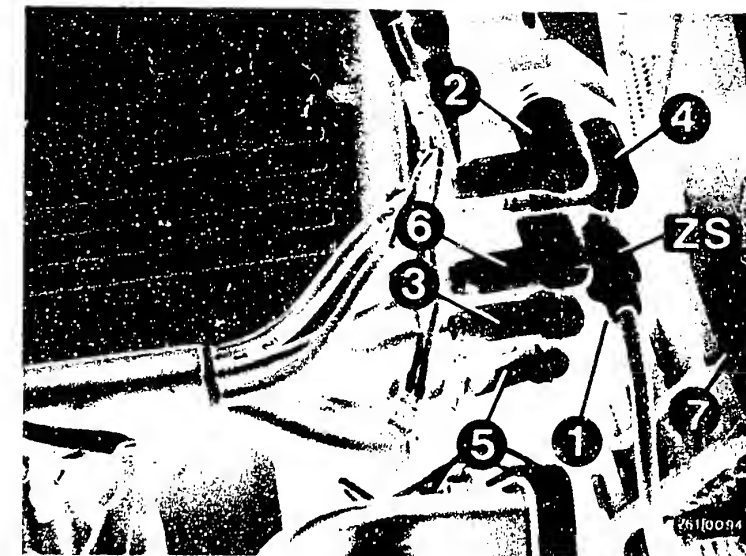
Air-flow sensor O.K.?

no

Testing: Open air-flow sensor flap by hand. It must be possible to open the air-flow sensor flap with uniform ease from its fully closed position to its fully open position. When released, the flap must close completely by itself. When the air-flow sensor flap is opened it must not catch at any point. Watch for any indications of abrasion or rubbing. Clean air-flow sensor if the inside is very dirty and rub out with a lint-free cloth. If there are any signs of abrasion or rubbing, replace the air-flow sensor.

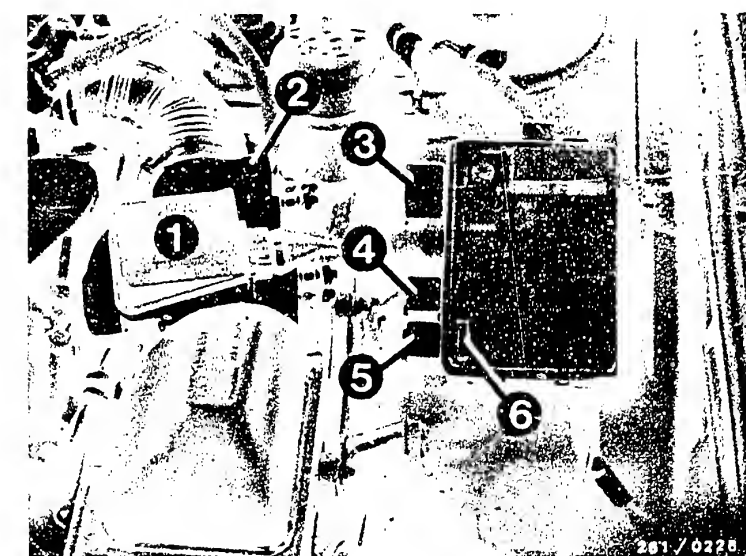
yes

Continued on L19/L20



High-voltage distributor
1 to 6 = cylinder numbers
ZS = High-tension lead to ignition coil
7 = Radiator cover

1 = Air-flow sensor with NTC I
2 = Idle-mixture-adjusting screw



L17

CO adjustment
BMW 525e



L18

CO adjustment
BMW 525e



CO adjustment at idle too low or too high (continued)

yes

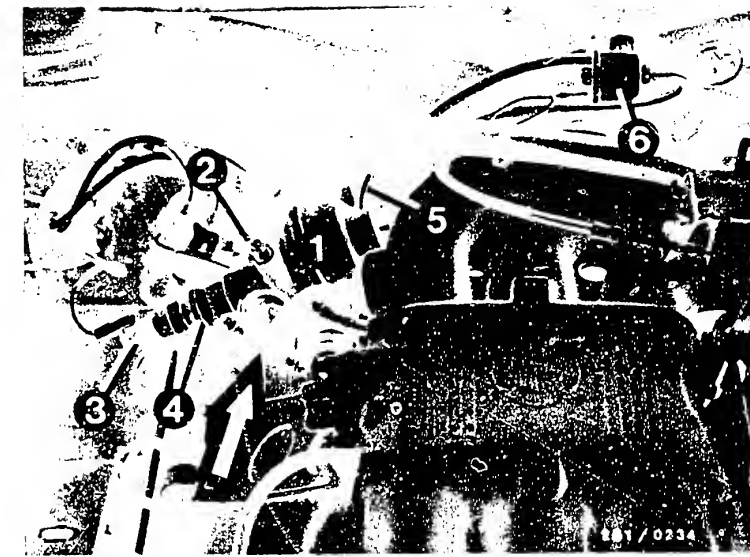
Are all hose lines and electric leads securely attached?
Visual examination.
Is the air-intake system leak-tight?

no

Check whether hoses of air-intake system and of fuel line system are securely attached, not kinked or damaged. If necessary, replace hoses. Eliminate leaks with new seals or by re-tightening the connecting screws.
Leak test: Seal off exhaust tail pipe. Take out air filter element and seal off air-flow sensor duct. Unscrew hose to idle-control valve and blow air (0.3 bar gauge pressure) into the intake manifold with a compressed-air gun. Seal off port on idle-control valve. Fully open throttle valve. Using soapy water, brush or spray all joints. Bubbling or foaming indicates a leak. Check electrical plug-in contacts for loose contacts.

yes

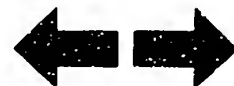
Continued on L21/L22



Arrow=Hose to idle-control valve

L19

CO adjustment
BMW 525e

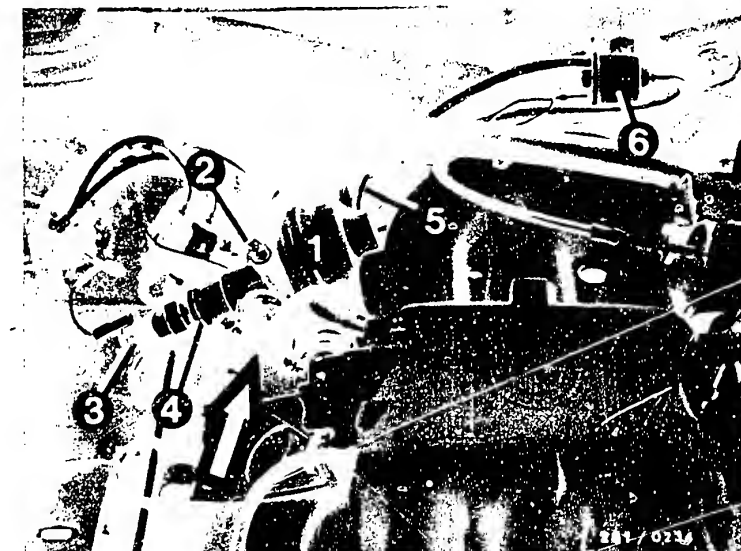
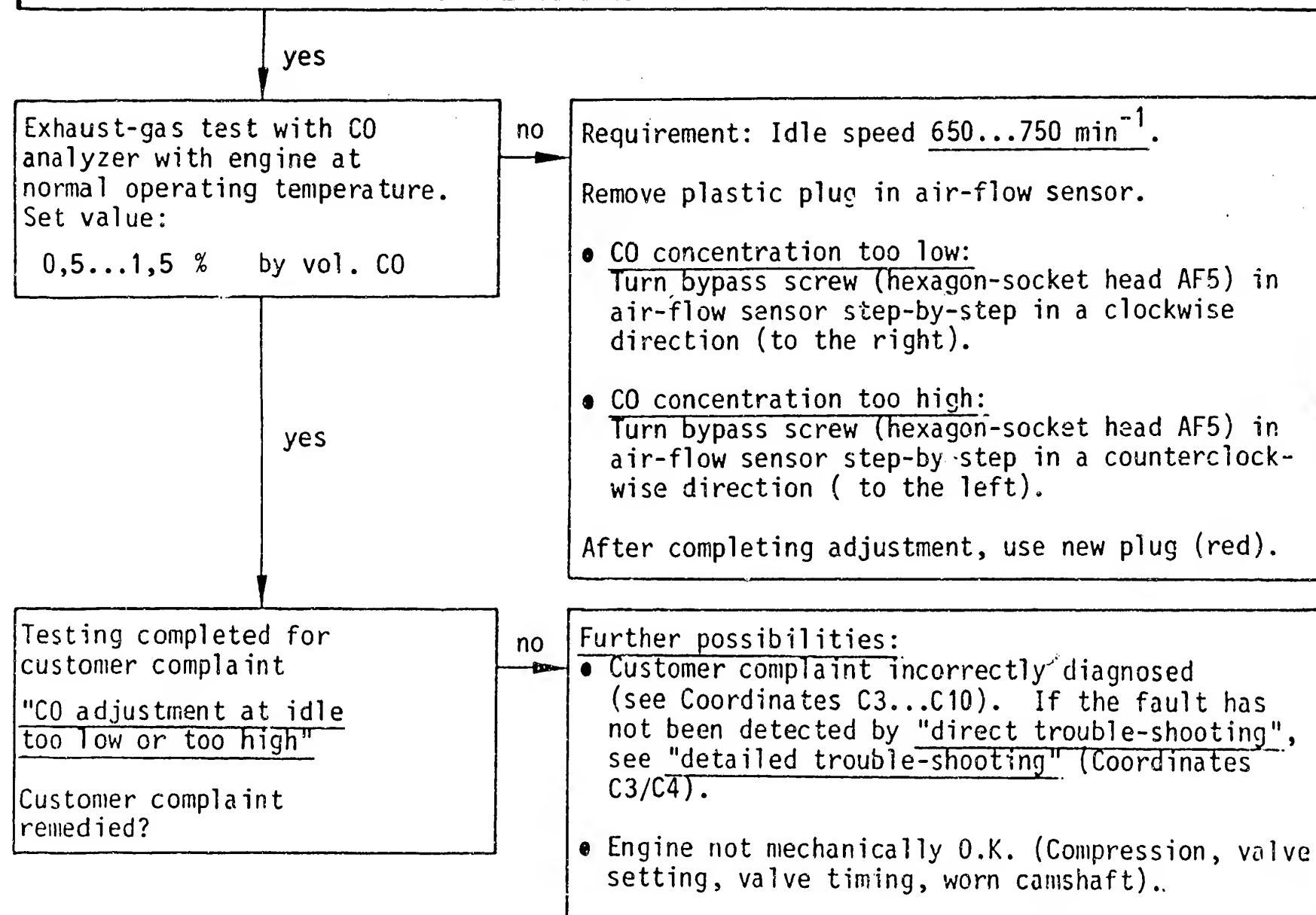


L20

CO adjustment
BMW 525e

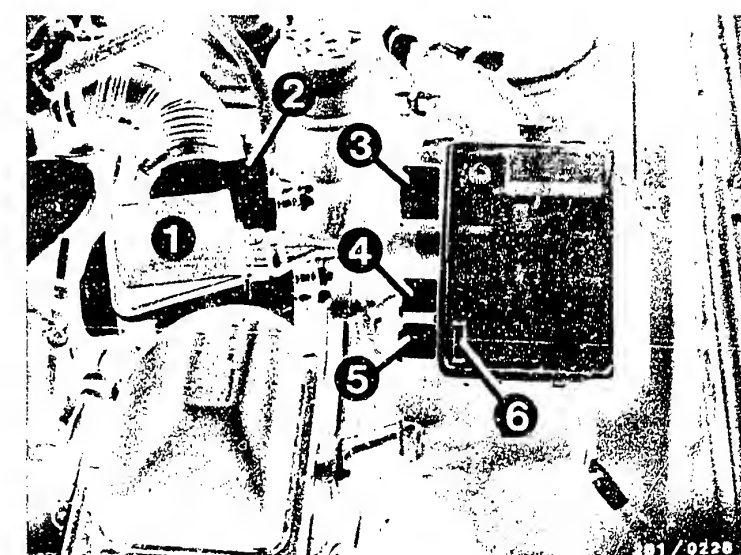


CO adjustment at idle too low or too high (continued)



2 = Idle-speed-adjusting screw

1 = Air-flow sensor with NTC I
2 = Idle-mixture-adjusting screw



After-sales Service

Motor Vehicle Service Information

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Electrical equipment

CORRECTION OF THE IGNITION POINT AND ADDITIONAL
MIXTURE ADAPTATION WITH MOTRONIC CONTROL UNITS -
WITH THE AID OF THE PC-BOARD SWITCH AND
ADJUSTMENT PIN KDMT 0002

VDT-I-Gen. 058 En
4.1983

Since August 1980 Bosch has been supplying Motronic control units containing a PC-board switch which is accessible from outside.

The introduction of this switch means that workshop personnel have the possibility of changing the ignition point and are also provided with an additional mixture adaptation facility. The values for mixture and ignition correction/adaptation are held within relatively tight limits. A correction may only be undertaken when (1) the fuel quality is not sufficient or when (2) the mixture must be adapted despite the fact that all other known measures have been tried (according to after-sales service instructions).

Unnecessary adjustment to the switch though, leads to poor driveability, and particularly to "search" during overrun or to increased fuel consumption, in some cases even to engine damage.

The vehicle-related Service Information bulletins should at all costs be carefully observed. This Service Information bulletin also gives exact details on the adjustment ranges of the switch positions.

Ignition-point correction

The quality of the gasoline in various countries does not always comply with the standard required for this engine. It is therefore recommended that for journeys in countries where the premium gasoline (super-grade) octane number (research method) is below 98, a correction be carried out to the ignition point by means of the PC-board switch. This applies especially to the Porsche 944. Details can be found in the vehicle-related Service Information bulletin.

The correction of the ignition point must be made in the "retard" direction and applies across the whole of the ignition point map. The correction prevents the "ping" and "knock" which are dangerous for the engine.

The adjustment of the ignition point leads, inevitably, to an increase in fuel consumption.

For this reason the original setting should be adjusted again after the journey for which such an adjustment was made.

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N1

Service Information

BMW 525e



Mixture adjustment

As is already known, the CO-adjustment takes place through the idle-mixture screw in the air-flow sensor. This is still the case and no change has taken place here. The PC-board switch though, apart from changing the ignition point also provides an additional possibility of adjusting the mixture. The PC-board switch is operative over the complete range as opposed to the bypass in the air-flow sensor which is only effective at idle and lower part-load range. For this reason, a change in the mixture using this switch is only justified when it is absolutely certain that defects are not present on the engine (i.e. valves, intake system, exhaust), the fuel-injection system or the ignition.

The Motronic is checked using the after-sales service instructions which have already been issued.

Further details as well as a table with switch positions and relevant operating range can be found in the vehicle-related Service Information bulletin.

Special adjustment pin KDMT 0002 for the PC-board switch (Fig. 2)

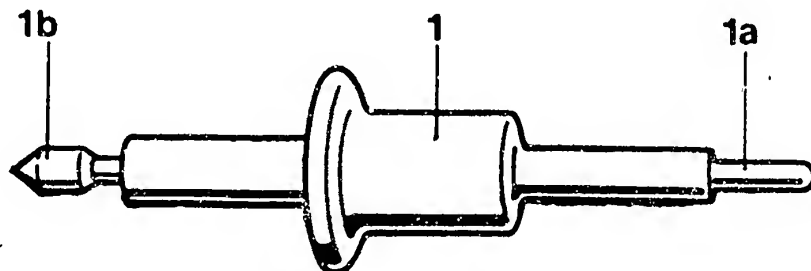
Bosch has developed a special tool for the correct and safe adjustment of the PC-board switch. The tool is made of plastic and prevents damage to the costly control unit when the cover is pressed in and when the switch is pushed up against the stops. When too much force is used, the triangular end of the pin breaks off.

NEVER use a screwdriver to adjust the PC-board switch.

The special tool KDMT 0002 is available through the usual channels or directly from KH/VKD 4. Subscribers to the tool program receive it automatically.

Please note: Tool KDMT 0002 replaces the existing tool KDMT 0001.
KDMT 0002 has a wider range of uses (see below)

Fig. 1



- 1 = Adjustment pin
- 1 a = Bore (triangular polygon) for adjusting the PC-board switch
- 1 b = Tool part for removing the cover (only for control units with metal housing)

Adjusting the PC-board switch

Remove the control unit (see after-sales service instructions)

At the moment there are two kinds of control unit: with cast frame (former design, Fig. 2) and with metal housing (new design, Fig. 3).



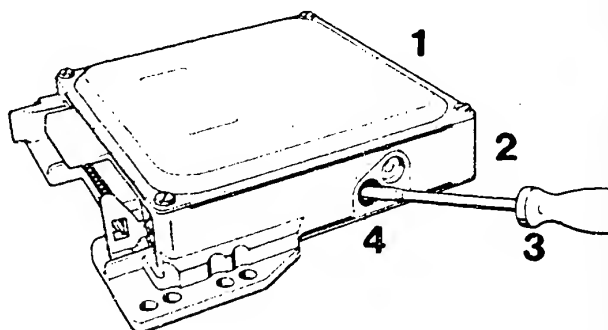
With control units with cast frame (Fig. 2) proceed as follows:

Using a screwdriver, carefully remove the cover. In order to do this, insert a wide-bladed screwdriver into the side at an angle, carefully push through the cover and remove it (Fig. 2). Take care that the PC-board is not knocked or otherwise contacted in the process.

The hole (triangular polygon) is now free for insertion of the special tool KDMT 0002.

Fig. 2

- 1 = Control unit with cast frame
- 2 = Diode
- 3 = Screwdriver
- 4 = Cover for PC-board switch

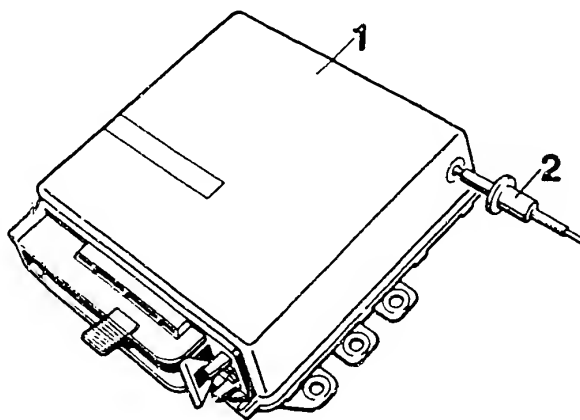


With control units with metal housing (Fig. 3) the cover should be removed as follows:

The point of the adjusting pin intended for removing the cover (Fig. 1, no. 1b) should be inserted fully into the cover (Fig. 3). This loosens the locking device of the cover and enables the latter to be removed. Now the hole (triangular polygon) is ready to receive the bore of KDMT 0002.

Fig. 3

- 1 = Control unit with metal housing
- 2 = Adjusting pin KDMT 0002



The following applies for both kinds of control unit:

Due to the danger of destroying the control unit, metallic objects or screwdrivers are NOT to be used, only the special tool KDMT 0002.

Using a minimum of force, turn the PC-board switch to its left-hand stop (Fig. 4). If already adjusted, count the number of "click" positions and note them down.

Select the new switch position according to the vehicle-related table.

Start counting the "click" positions from the left. Take into account the fact that the switch has defined detent positions and intermediate positions are not possible.

Check that the setting is correct by using the CO-analyzer and by taking the vehicle on a test run.

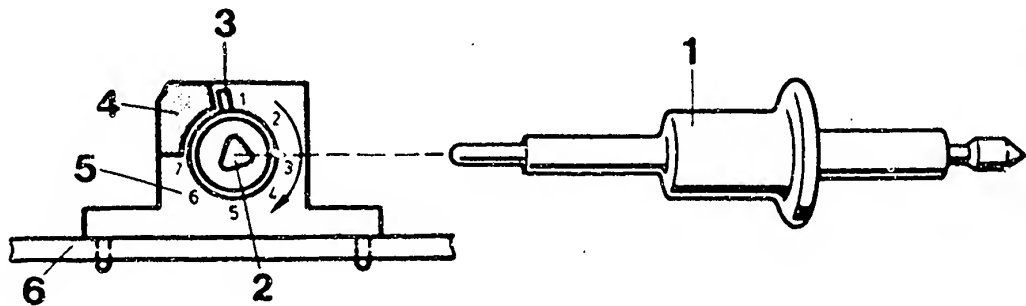
After the adjustment has been completed, a new cover (red) MUST be fitted in the hole in the control unit. This is important because it guarantees protection against humidity and prevents unauthorized tampering.

Part no. for cover (red) for control unit with cast frame: 1 280 508 012

Part no. for cover (red) for control unit with metal housing : 1 260 321 002

Please note: Black and blue covers are only fitted by Bosch or the vehicle manufacturer at their works.

Fig. 4



- 1 = Adjusting pin KDMT 0002
- 2 = Hole (triangular polygon)
- 3 = Basic position (left-hand stop)
- 4 = Stop
- 5 = Switch positions ("click" positions)
- 6 = PC-board



After-sales Service

Technical Bulletin

Only for use within the Bosch organization. Not to be communicated to any third party.

13...39

VDT-I-261/102 En

6.1983

PARTS SET FOR SOLENOID-OPERATED INJECTION VALVES

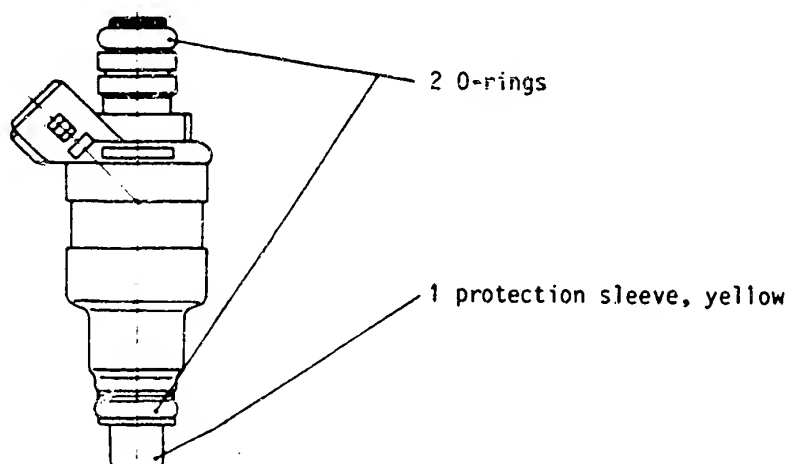
Supersedes 8.1982 edition

0 280 150 2..

AND PRESSURE REGULATORS 0 280 160 2..

A common parts set is available for the Motronic solenoid-operated injection valves and pressure regulators with the new method of connection.

Contents for 1 injection valve:



Contents for pressure regulator:

1 O-ring

1 supporting plate

Since the above-mentioned parts are subjected to extreme temperature stress, they should be exchanged for new parts whenever servicing is carried out.

"Unmetered air" sucked in through injection-valve seals which are not tight, is a frequent case for servicing.

The parts set has the part number 1 287 010 704 and will in future be listed in the service parts microfiche under solenoid-operated injection valves (see EE 00 under 0 280..).

Please direct questions and comments concerning the contents to our authorized representative in your country.

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N5

Technical Bulletin

BMW 525e



Technical Bulletin

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28

PLUG CONNECTORS FOR
JETRONIC COMPONENTS
Parts sets

VDT-I-280/111 En

11.1984

(supersedes edition 11.1982)

Parts sets are available for replacement of Jetronic plug connectors. These consist of:

- Plug connector housing
- Protective cap (rubber sleeve)
- Contact springs

These parts are listed on microfiche EE...*.

* see microfiche EE00 under 0 280 ..

- Plug, black, 2-pin,
parts set 1 287 013 002 cable connector in conjunction with socket, 2-pin
- Socket, black, 2-pin,
parts set 1 287 013 001 for e.g.

Temperature sensor	0 280 130 0..
Auxiliary-air device	0 280 140 ..
Thermo-time switch	0 280 130 2..
Start valve	0 280 170 ..
Warm-up regulator	0 438 140 ..

- Socket, grey, 2-pin
parts set 1 287 013 003 for:

Solenoid-operated injection valve	0 280 150 ..
--------------------------------------	--------------

N6

Technical Bulletin

BMW 525e



- Socket, black, 3-pin,
parts set 1 237 000 039 for:
Throttle-valve switch 0 280 120 ..
- Socket, black, 5-pin,
parts set 1 287 013 006 for:
Air-flow sensor 0 280 20. ..
(LE version)
- Socket, black, 6-pin,
parts set 1 287 013 004 for
Air-flow sensor 0 280 200 ..
- Socket, black, 7-pin,
parts set 1 287 013 005 for:
Air-flow sensor 0 280 20. ..
Air-mass sensor 0 280 211 ..
- Wiring-harness plug connector, black, 25-pin
parts set 1 287 013 009 for:
Control unit 0 280 0..
- Wiring-harness plug connector, black, 35-pin,
parts set 1 287 013 008 for:
Control unit 0 280 0..

The contact springs (minitimers) are also available separately under part no. 1 284 477 026.

The plug-connector housings are only available in the stated colours.

Responsible:

Robert Bosch GmbH

Division KH

Technical After-Sales Service (KH/VKD 2)

Please direct questions and comments concerning the contents to our authorized representative in your country.



Table of contents

For direct trouble-shooting of a specific Motronic component, it is absolutely necessary to look up the component under the appropriate customer complaint.

<u>Section</u>	<u>Coordinate</u>
Structure of microfiche	A 1
1. Rapid diagnosis chart	A 2 - A 14
2. Test specifications	A 15 - A 16
3. Electrical terminal diagram	A 17 - A 18
3.1 Electrical wiring diagram	A 19 - A 20
4. Diagram of fuel lines	A 21
5. Test equipment and tools	A 22 - A 23
6. Installation position of components	B 1 - B 2
7. General information	B 3 - B 5
8. Trouble-shooting	C 1 - C 10
8.1 Detailed trouble-shooting	C 3 - C 4
8.2 Direct trouble-shooting	C 5 - C 10
9. Test with universal test adapter	C 11 - G 3



Table of contents (continued)

Trouble-shooting program according to customer complaint

<u>Section</u>	<u>Coordinates</u>
<u>STARTING MOTORS TURNS, ENGINE DOES NOT START OR STARTS ONLY WITH DIFFICULTY.....</u>	G 4 - G 21
Secondary pictures.....	G 6 - G 7
Electric fuel-injection valves.....	G 6 - G 11
Electropneumatic idle-speed control.....	G 12 - G 17
Air-flow sensor.....	G 18 - G 19
Hose-lines, electric lead connections, and test for leaks.....	G 18 - G 19
 <u>ENGINE STARTS AND THEN DIES AGAIN</u>	 H 1 - H 12
Hose lines, electric lead connections, and test for leaks	H 3 - H 4
Electropneumatic idle-speed control	H 5 - H 10
Air-flow sensor.....	H 11 - H 12

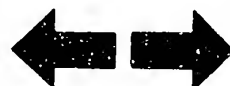


Table of contents (continued)

	<u>Coordinates</u>
<u>UNEVEN ENGINE IDLE</u>	H 13 - J 8
Secondary patterns	H 15 - H 16
Air-flow sensor	H 15 - H 16
Throttle valve closed?.....	H 17 - H 18
Hose lines, electrical lead connections and leak test.....	H 19 - J 20
Electropneumatic idle-speed control.....	H 21 - J 2
Injection valves.....	J 3 - J 6
Engine-speed and CO adjustment.....	J 7 - J 8
 <u>POOR THROTTLE TAKE-UP</u>	 J 7 - J 24
Secondary patterns.....	J 11 - J 12
Throttle valve closed?.....	J 13 - J 14
Air-flow sensor.....	J 15 - J 16
Hose lines, electrical lead connections and leak test.....	J 17 - J 18
Electropneumatic idle-speed control.....	J 19 - J 24
 <u>ENGINE MISSING UNDER ALL OPERATING CONDITIONS</u>	 K 1 - K 14
Secondary patterns.....	K 3 - K 4
Plug-in connections.....	K 3 - K 4
Air-flow sensor.....	K 5 - K 6
Fuel delivery.....	K 7 - K 8
Coughing on overrun.....	K 9 - K 12
Control unit.....	K 11 - K 12
Alternator.....	K 13 - K 14
Interference-suppression devices.....	K 13 - K 14
Spark-plug connectors.....	K 13 - K 14

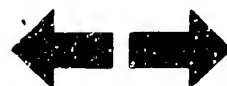


Table of contents (continued)

	<u>Coordinates</u>
<u>FUEL CONSUMPTION TOO HIGH</u>	K 15 - K 24
Secondary patterns.....	K 17 - K 18
Air-flow sensor.....	K 19 - K 20
Injection valves.....	K 19 - K 22
Exhaust-gas setting.....	K 23 - K 24
 <u>MAXIMUM ENGINE POWER/TOP SPEED</u>	
<u>NOT REACHED</u>	L 1 - L 14
Secondary patterns.....	L 3 - L 4
Throttle valve opening fully?.....	L 3 - L 4
Air-flow sensor.....	L 5 - L 6
Air-intake passage.....	L 5 - L 6
Fuel delivery.....	L 7 - L 8
Fuel pressure at full load.....	L 9 - L 12
Hose lines, electrical lead connections and leak test.....	L 13 - L 14
 <u>CO ADJUSTMENT AT IDLE TOO LOW</u>	
<u>OR TOO HIGH</u>	L 15 - L 22
Secondary patterns.....	L 17 - L 18
Air-flow sensor.....	L 17 - L 18
Hose lines, electrical lead connections and leak test.....	L 19 - L 20
Exhaust-gas setting.....	L 21 - L 22
 Service Information.....	 N 1 - N 4
Technical Bulletin.....	N 5 - N 7



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